THE
ELECTRICAL REVIEW

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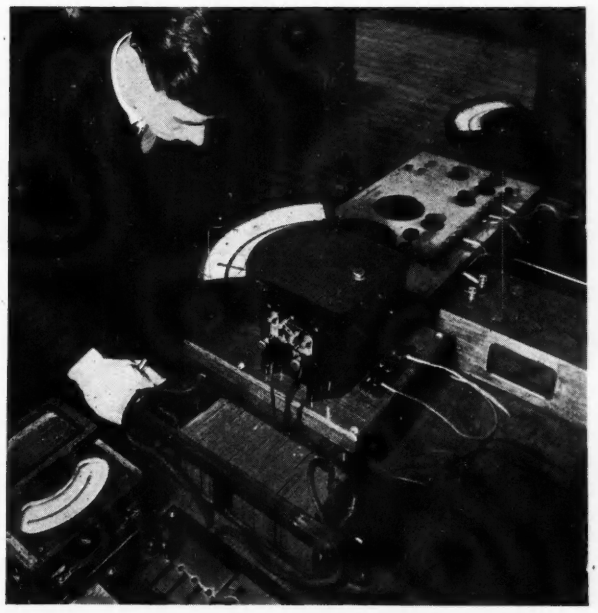

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Light as a War Need

Progress During the Past Year

ONE year ago, when our last annual lighting number appeared, it seemed desirable to point out that, while the immediate need was to prevent visibility of artificial light from the sky, illumination generally was likely to be of greater importance than ever before. Subsequent events have fully confirmed this expectation, and in this issue we report progress, as it were. Developments have proceeded on two very distinct lines. The first is the limiting of the amount of light allowed for movement out-of-doors to that which would avoid attracting aircraft—a defensive measure. The second is the provision of improved illumination values in workshops as a factor in the aggressive prosecution of the war.

With regard to the A.R.P. aspect, the requirements of the Ministry of Home Security have been given practical shape in several specifications drawn up by the British Standards Institution. The bearing of these is explained by Mr. J. F. Stanley in his article this week. One of these Specifications is of more general interest in that it deals with luminescent materials which emit light when activated by ultra-violet rays. These have not yet fulfilled anticipations, but the obviating of the need for shielding the source and the absence of spilled light make their use potentially attractive.

Modified Street Lighting

The principal achievement in black-out lighting has probably been the design of fittings which do not show the tell-tale pool of light on the ground as ordinary reflectors do and which, as Mr. E. E. Hoadley says, are quite effective in increasing the safety of the streets on dark nights. Mr. Hoadley's testimony is especially convincing since it is based upon a weighing-up of the pros and cons as a result of experience, which has caused him (like so many others during this first year of war) to modify opinions he had previously formed.

To turn to more positive aspects, it is clear from a further (Fifth) Report which the Departmental Committee on Lighting in Factories has found it necessary to issue within the past few weeks that the minimum foot-candle values recommended a couple of years ago for general illumination has proved to be insufficient, having regard to the long hours of working by artificial light in workshops engaged on Government contracts. Inadequate illumination is a more common cause of industrial fatigue than is often realised, especially when accompanied by the strain of working under war hazards. So also is bad ventilation due to the restriction on air changes that has resulted from the use of light traps designed only with a view to preventing the emission of light. This is the subject of another recent British Standard, the adoption of which would rectify the defect quite easily in most cases.

Expert Advice Essential

To aspire merely to the minimum general values of illumination prescribed in the Report is not good enough for maintaining production (for export as well as for munitions) at the highest level without overstraining the operatives. For the processes themselves the I.E.S. Code should be followed, and in this and in other directions also the purposeful suggestions made in Mr. A. D. S. Atkinson's article are very much to the point. In order to give effect to these, appropriately designed fittings are essential, and the way in which the manufacturers have risen to the occasion is evident from the details given in another article in this issue. In order to get the most out of what has been made available in this way, skilled advice in installation is essential. It is as well worth while as is the unstinted use of electricity itself for securing the best results.

Increased production of munitions of war, however, is not enough to bring victory. For his temporary successes against less fortunate countries, our enemy has not relied entirely on military prowess or on superior mechanisation. He has made terribly effective use of "political" weapons, in which are included utterly ruthless assaults on the morale—or, in common parlance, the "nerves"—of his victims. This gives a special cogency to the observations of Mrs. Forrest on lighting in the home, since there can be no possible doubt that good lighting promotes the cheerful spirit that goes right on to the end. It applies also, perhaps to an even greater extent, to the notes of Mr. J. J. Lesser on air-raid shelters. His warning that places intended for safety may bring risks of their own is unfortunately to our knowledge only too necessary. The notion that any handy fellow is competent to fix up

a lighting or heating installation unfortunately still persists despite sad evidence to the contrary. To sum up, good lighting, meaning not only adequacy of foot-candles but also freedom from glare and the use of properly designed fittings and well-planned installations, is essential to the pursuit of victory.

Safety Regulations

A NEW edition of Safety Rules for the Installation and Maintenance of Electrical Supply Stations (H.31, superseding H.6) has been issued by the U.S. National Bureau of Standards. The nearest equivalent to this code in Great Britain is the Electricity Regulations for Factories, which include within their scope generation and transformation by way of trade, but which differ from it materially both in form and in content. On the analogy of the reputed inferiority of the footwear of shoemakers' children, presumably, the American Rules prescribe minimum illumination values for generation rooms, switchboards, boiler houses, pump rooms and the like. Another feature is the specific requirement that earthing conductors shall be protected from mechanical damage, which finds its counterpart only by implication in the Factory Regulations and even the I.E.E. Rules in this country. The most obvious point of non-resemblance to the Factory Regulations is, however, the absence of an explanatory memorandum like that which makes the latter not only a compulsory code, but also a work of considerable instructional merit.

Ban on H.F. Apparatus

ABOUT two months ago a Defence Regulation was issued requiring all persons in possession of certain high-frequency apparatus to notify the police. This has now been followed by an Order made by the Home Secretary forbidding the possession of such apparatus with an output of more than 10 W without a permit from the Postmaster-General. The Order covers a wide range of equipment, the principal classes being electro-medical apparatus, furnaces, eddy current heating apparatus and testing oscillators. Permits will be granted only to recognised hospitals and similar institutions, manufacturers who need to use h.f. apparatus and dealers, and to research and instruction laboratories. X-ray equipment and the normal small "home" type electro-medical appliances are not affected. Although, no doubt, the Order will cause a certain amount of inconvenience there is ample evidence of its necessity; the range of interference with Service radio has been found to be very considerable.

Trade With South America

AMERICAN electrical export figures for June exhibited a very substantial increase in comparison with the value recorded for the corresponding month of last year. No details of their distribution are yet available but it is a safe assumption that the Latin American markets are turning to the United States for much of the electrical equipment formerly obtained from European countries. This probability is strengthened by the fact that American shipping is now precluded almost entirely from entering European waters. We, too, are looking to South America as a market for our goods and no doubt we shall find ourselves in competition with the United States—as we always have done. But the Americans are rivals with whom we can compete on more level terms than those which existed between ourselves and Continental suppliers before the war. It should be possible for both the United States and Great Britain to secure a greater share of South American trade without disturbing the harmonious relations existing between us.

Trolley-wire Suspension

ON a new trolley-bus system between Winterthur and Walfingen in Switzerland, the overhead wires are deflected alternately left and right at each pair of support standards. As a result of this continuous zig-zag, the *Transport World* states, the sag of the wires is maintained almost constant irrespective of temperature. Suspension points are from 30 to 35 metres apart instead of the more usual 25 metres in that country, improving the appearance of the street. Vehicles are said to negotiate the suspension points with great smoothness, and oscillations of the wires are rapidly damped out. It is claimed also that contact-shoe carbons have a much longer life. While it is as yet too early to draw definite conclusions, a simple system of this kind, which is only 3.1 km. long and operates three buses at a service interval of ten minutes, provides relatively easy conditions. It seems open to question whether the same kind of suspension would prove satisfactory on the complicated junctions met with in North London, for example, where even to-day the shoes of a bus may be knocked off when another bus follows it too closely on a curve. Further, the advantage of extending the length of the bays would not apply to conditions here, as even the extended bays are shorter than the standard length in this country, where breakage of wire and undue oscillations usually cause no trouble when the line is well maintained.

Master of Physics

THE Cavendish Laboratory over which the late Sir Joseph Thomson presided for thirty-four years—following such men as Clerk Maxwell and Rayleigh and immediately succeeded by Rutherford—has led the world in providing knowledge of the constitution of the atom and all that this implies in the sphere of practical engineering. The discovery of the electron will be the chief claim to fame of Thomson, an outline of whose career is given in this issue. This discovery was much more than a happy inspiration. It was based on a most profound knowledge of his subject. As Sir Oliver Lodge, whose death we recorded last week, once happily expressed it, the Master of Trinity was Master of Physics. We could wish that both men, whose work and aims in life were so entirely beneficent, could have been spared a little longer that they might have seen the restoration of the values of human happiness for which they had laboured.

A Lost Cause

TESTIMONIALS to the strong position held by electricity in the lighting field come quite frequently from our rivals the gas people, and some recent remarks by "Janus" in the *Gas Times* drive the point well home. He says that "for years and years I fought for gas lighting only to be told by the leading authorities that I was wasting time and space. In the end I came to believe them; reluctantly . . . but when the leading lights tell us that the horse is dead we must begin to wonder if flogging is worth while. There was a vague idea that we might hold public lighting—and the war put a period to that bright notion." He goes on to refer to the use of electric lighting in gas showrooms and to the lack of real interest in modified street lighting. The last point should be noted by the electrical industry which should take all possible steps to impress upon lighting authorities the need for this street lighting and the industry's ability to meet it.

Changing Insulators

A NOTABLE difference between British and American methods in the maintenance of transmission lines lies in the practice in the United States of working on live high-voltage lines. Thus the Potomac Edison Co. permits working on conductors while alive up to 6.9 kV with 20-kV rubber gloves and rubber protective hose and mats. In order to expedite a change-over from 13.2 kV to 33 kV on a rural line recently, the company adopted a novel method. A pivot-type wooden platform with collapsible rails was designed to which material and tools were hoisted (only as required) by means of an endless hand-line run through a block. According to the *Electrical World* a crew of seven trained men changed 1,500 insulators in twelve days at the rate of two insulators each per hour. The men preferred the new method, which has been standardised for general live-line work up to 12 kV with earthed neutral.

INDUSTRIAL LIGHTING

Some Advice on Planning Installations

By A. D. S. Atkinson

THE Fifth Report of the Departmental Committee on Lighting in Factories has been available for some little time and it is to be hoped that all responsible factory executives are already familiar with its salient features. As yet there has been no official pronouncement as to the date on which new legislation, or an Order, enforcing the recommendations contained in the Report will be made, but the electrical industry as a whole is expecting it to be soon, and is planning accordingly. Even casual perusal of the Report, combined with a knowledge of lighting conditions in a large number of factories, indicates that a very great deal of surveying, planning, and alteration to existing installations, or erection of new ones, will have to be undertaken; and although compliance with new regulations might not be enforced immediately in the case of factories not engaged on essential work, it is evident that the comparatively small number of engineers who are skilled in planning lighting schemes will have their hands full for some time to come.

Mr. Atkinson is with the E.L.M.A. Lighting Service Bureau

Bearing in mind that the Fourth Report of this Committee issued two years ago, called for a minimum illumination on the working area of only 1 ft.-candle at floor level, the new recommendation of a minimum of 6 ft.-candles at a level 3 ft. above the floor, may at first strike one as surprising. So greatly have working conditions changed, however, on account of the black-out and the industrial speed-up that a 1 ft.-candle installation can no longer be tolerated, partly because of the consequent slowing up of output, and partly because of the unhealthy effect it has on the minds and bodies of employees condemned to work under it. Fortunately the majority of factories previously content with a miserable one or two foot-candles are not those on which we are at present relying for our intensive arms drive. Few outside influences could be better calculated to spread gloom and despondency if endured for any length of time, and few could exert such a pronounced and continuous braking effect on the production of finished articles.

The decrease of production associated with poor lighting is of extreme importance nowadays. In peacetime only 10 or 15 per cent. of work was normally carried out under artificial light, taking an average throughout the whole year. Poor artificial lighting resulting in a production decrease of perhaps 20 per cent. while in use, thus caused a total annual production loss of only about 2 or 3 per cent., but nowadays, when artificial light may have to be used for half, or even perhaps all, of the total working time interference with production becomes of the greater importance. Further indication that this has been recognised in official quarters is to be found in the fact that certain factories have already been required to install lighting systems in accordance with the I.E.S. Code of recommended illumination values for processes, which vary from 6 to 10 ft.-candles for certain classes of work up to over 50 ft.-candles for precision work to a high degree of accuracy.

Reduction of Excessive Brightness

Clauses 4, 5 and 6 of the Report dealing with permissible limits of brightness of fittings, screening of local lights, and avoidance of reflected glare need little comment, since they were embodied in the Fourth Report, and have already been widely discussed in this journal and elsewhere. It may, however, be worth while re-directing attention to three points of general interest.

First, all electric and gas lamps (with the exception of 40-W and 60-W opal electric lamps) have intrinsic brilliancies exceeding the 10 candles per sq. in. recommended as a maximum permissible under the conditions stated in clause 4. This automatically debars the use of bare lamps or conical shades, or similar antiquated reflecting equipment, at a height of less than 16 ft. above the floor, while at the same time the Report clearly indicates the advisability of controlling the light in a proper manner even when the lamp is mounted at a greater height than 16 ft.

As regards the recommended 20 deg. cut-off of fittings mounted below 16 ft., in the case of clear and pearl lamps the position of the centre of the filament is taken to be the position of the lamp, but in the case of opal lamps it is the lowest visible part of the bulb which requires shielding, since this part is of about the same brightness as all the rest of the lamp, and is (probably) over 10 candles per sq. in. The same basis should be employed to judge whether a local light is "completely screened from the eyes of every person employed at a normal working place." It need hardly be pointed out that if recognised standard reflecting equipment made by reputable firms is used with the lamp for which it is intended, and in the manner in which it is intended, no trouble should arise in respect of these three clauses.

Left: One method of reducing excessive lamp brightness in a drawing office. Shielded, bowl-silvered or capped lamps illuminate a hood which re-directs the light downwards, practically eliminating shadows and dazzle reflected from glossy paper

In this room, devoted to the inspection of small engine parts, the whitened balcony wall avoids a depressing effect and adds materially to the illumination on the benches. This factor is stressed in the Report mentioned in the article

Experience in blacked-out factories during the summer has clearly indicated the desirability of utilising methods of obscuration which can be partly removed in daytime, so that at least some natural daylight will be admitted. In a number of cases it may be possible by this means to admit sufficient daylight to render supplementary artificial lighting unnecessary, but even quite a small admission of daylight is usually considered worth while from a psychological standpoint. Employees know very well that there is daylight outside and they like some visible indication of it inside the factory if it can possibly be provided. Sometimes it cannot, and a good deal of interest has been shown lately in artificial lighting systems which are specially constructed and installed in such a manner that natural lighting is copied as closely as possible in all respects. Large, low brightness artificial laylights have been mounted near black-out roof lights, and if they are equipped with 5-ft. tubular fluorescent lamps it is indeed difficult to realise that the illumination is not provided by natural daylight through unobscured glazing. There is also the added advantage that specular reflection from polished surfaces, which is such a handicap to seeing in some industrial operations, is reduced to an absolute minimum.

Discharge Lighting

There may, however, be a difficulty in the extensive application of this type of lighting, or of any other lighting system employing discharge lamps at the present time, on account of the steel necessary for the control gear. It is apparent that factory executives will not be entirely free to choose discharge or tungsten lighting according to their wish, as they could do in peacetime, nor will the fact that a discharge system, on account of its low running cost, pays for itself in a number of years necessarily indicate that it should be used in any given instance. Running cost is, of course, of importance, even for factories engaged on vital war work, but conservation of materials in restricted supply and conservation of labour may be even more important at the present time.

It is suggested, therefore, that when considering whether to employ discharge lighting for new installations, or for the purpose of bringing existing installations up to the required standard of illumination, the following points should be taken into account:—

(a) Is the factory already lighted by discharge lamps?

(b) Is discharge lighting recognised as having definite merits for the process to be carried out in the area concerned?

(c) In a factory at present using tungsten lighting, and in which the illumination must be raised, is the wiring already loaded to its limit? In such a case, conversion of existing points to use discharge lamps may be cheaper and more convenient than extensive re-wiring. In some instances the addition of an auxiliary discharge system interspaced with the existing tungsten installation may give the required level of illumination without materially increasing the load on the wiring. Both the above expedients may avoid the serious disorganisation which might otherwise occur.

(d) Will the extra cost of a discharge installation be recovered in a short time, by reduction of running cost? In this connection it may be pointed out that the reduced heating effect of discharge systems may result in a saving in the cost of ventilating or temperature control plant.

Exterior Illumination

Whatever may be said about the efficiency or otherwise of the sirens, the air-raid warning system appears to be working sufficiently well to permit the continued use of exterior lighting for certain purposes, except when raids are imminent or in progress. Permission to use such lighting is only granted in special instances, and illumination is limited to 0.002, 0.02, or 0.2 ft.-candles maximum, depending on the class of work to be done. It would, of course, be an exaggeration to state that lighting levels of this order are entirely adequate for work of rough or any other nature, but a very surprising degree of visibility can in fact be obtained provided that care is exercised in the design of the installation. Most engineers who have been concerned with wartime exterior industrial lighting will have heard derogatory remarks passed about the usefulness of the permitted standards, but in many cases the speakers' scorn has been aroused by the apparently miserable effect of a single BS/ARP fitting mounted on a pole in some convenient open space, from which an entirely false impression will be gained.

At these low values of illumination it appears from observation that a degree of variation of illumination which is acceptable with the relatively high lighting intensities of peacetime may be unduly large where low intensities are employed. A high degree of uniformity seems to be one of the major factors in determining the visibility of the work in hand, and to obtain this extra uniformity there are two main methods which may be used in the case of 0.2 ft.-candle installations, subject, of course, to official sanction. In the first place, instead of mounting BS/ARP 21 or equivalent fittings at their specified spacing (not less than twice the mounting height) it may be possible to reduce the spacing, and to use correspondingly smaller lamps, *e.g.*, a normal 0.2 ft.-candle installation for an area with approximately equal sides might employ fittings spaced 30 ft. by 30 ft. mounted 15 ft. high, each fitting being equipped with a 25-W lamp. An alternative method would be to keep the mounting height the same, but to reduce the spacing to about 22 ft., each fitting using 15-W lamps. The illumination in each case will be roughly the same but the uniformity of the second will be much higher.

A useful and effective alternative to overhead lighting for exterior work is lighting directed from the side by means of specially designed fittings, or by standard "peacetime" reflectors mounted at an angle and fitted with a hood or cowl to prevent the emission of upward light. For work on vertical surfaces, as in building, it is evident that light directed from the side can be arranged to give more illumination on the sides of walls, etc., without fear of exceeding the permissible maximum on the horizontal plane, than will lighting from overhead. Even for work on horizontal planes, side lighting appears to cast less dense shadows and to make the very best use of the specular reflecting properties of wet concrete and other materials with a degree of gloss. Unfortunately it is almost impossible to show the good effects of side lighting by means of photographs, since almost invariably a flash has to be used at these low lighting intensities, and the resultant picture gives little more than a view of the effect of the flash; but comparison between the visibility of identical working areas lighted by overhead or side installations leaves little doubt that the latter has distinct merits.

In conclusion, reference may be made again to the plans of the electrical industry to deal with the large amount of readjustment of existing installations, or erection of new ones which is expected to be necessary in the near future. The aim is to enable all factory executives who do not already obtain lighting advice, when they need it, through regular trade channels, to obtain such advice with the least duplication of effort and consequent waste of time. But it is of the greatest importance to ensure that industry *does* in fact get competent advice, based on experience and knowledge.

Vehicle Platform Lighting

THE August *Journal* of the Public Service Transport Association states that representations have recently been made to the Ministry of Home Security by the Association, supported by the Municipal Passenger Transport Association and the Omnibus Owners' Association, that better lighting on the platforms of road passenger vehicles is essential under black-out conditions if there is not to be a pronounced increase in the totals of "step" accidents. Considerable experimental work has been done by the London Passenger Transport Board in devising fittings which give a higher level of illumination on the "step" of a vehicle without, however, throwing an undue amount of light on the road. A demonstration of these fittings was arranged towards the end of July, and officials of the Ministries of Home Security and Transport, and representatives of the three associations, together with officials of the London Passenger Transport Board, discussed the question of improved "step" lighting.

As a result the Ministry of Home Security is advising chief officers of police in England, Wales and Scotland that on the platforms of tramcars, trolley vehicles and public service vehicles a degree of illumination will now be permitted higher than is at present authorised under Paragraph 25 of the Lighting (Restrictions) Order, 1940. The instructions being issued to the police are to the effect that, in addition to the interior lighting permitted by Paragraph 25, one lamp may be used on any platform by which passengers enter or leave the vehicle, provided that the illumination from the lamp at a level corresponding to the level of any of the steps does not exceed 0.1 ft.-candle, and that the illumination at any point at ground level outside, within a distance of 3 ft. 6 in. from the edge of the step, does not exceed 0.005 ft.-candle. (The maximum intensity permitted under the present Order at any point at ground level outside the vehicle is 0.001 ft.-candle.)

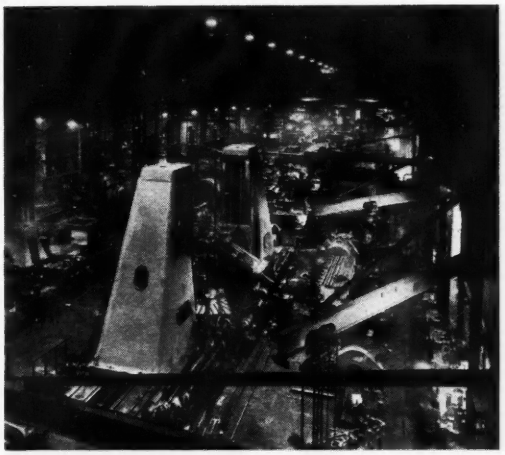
It is considered that the additional illumination now permitted should enable a passenger, when about to board or alight, to see with greater certainty when the vehicle has come to rest, and should also assist the conductor to observe more clearly when passengers have boarded or alighted.

All members of the three associations have been sent drawings of the type of lamp cowl by which the new level of platform lighting is being provided on vehicles of the London Transport fleet. A series of sample vehicles are being fitted up in various centres throughout the country, and on these vehicles the new platform lighting will be approved by a technical officer of the Ministry of Transport.

Fittings for Industry

A Review of Equipment Available

GOOD lighting of factories is important in peacetime, but essential in war. Without it, not only is production slowed down but there is a definite effect, both physiological and psychological, on the workers, which must inevitably impair their health and efficiency. Most factories engaged on war work are now operating twenty-four hours a day, and because of the black-out arrangements not a few of them are now operating entirely or almost entirely under artificial lighting throughout the day as well as at night. With the approach of the shorter days an efficient lighting installation will in any case become an increasing necessity if output is to be maintained or expanded, and there is no time to be lost if the lighting system is to be brought up to date before the winter. Incidentally it must not be forgotten that the provision of improved lighting is not only a wartime expedient but is a permanent amenity which will pay for itself over and over again by speeding up production. In any case the cost is negligible when considering the benefits derived.

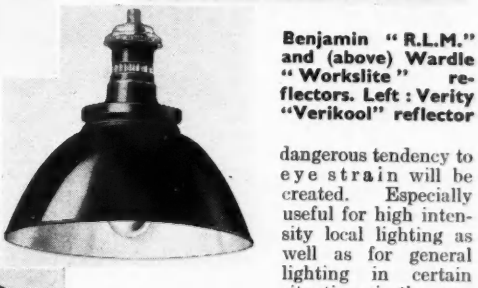


A typical fluorescent lighting installation by Crompton Parkinson

Wartime conditions have shown that normal industrial lighting methods are not entirely satisfactory, and that considerable emphasis must be placed not only on the quantity but also on the quality of the lighting if the welfare of the worker and therefore his productive capacity are not to suffer as a result of long hours spent under artificial lighting. Much work has been done on this aspect of industrial lighting in recent months and the Fifth Report of the Departmental Committee on Lighting in Factories, which Mr. A. D. S. Atkinson deals with in the preceding article, provides a good basis for the design of satisfactory installations. The Committee has raised the generally recommended minimum of lighting intensity from 1 ft.-candle at floor level to 6 ft.-candles at three feet above the floor. An increase of this kind obviously cannot successfully be achieved by any rule-of-thumb method such as indiscriminately fitting higher-power lamps. A planned lighting scheme must be devised, in which the existing lighting points and mounting heights are used to the fullest advantage with a minimum dislocation of production and careful use of available materials.

Dispersive reflectors for mercury lamps made by Revo and (above) the G.E.C. Right: Holophane heavy-duty extensive type reflector for use in general factory lighting

One of the latest Simplex reflectors and (above) Rowlands distributing reflector for mercury lamps



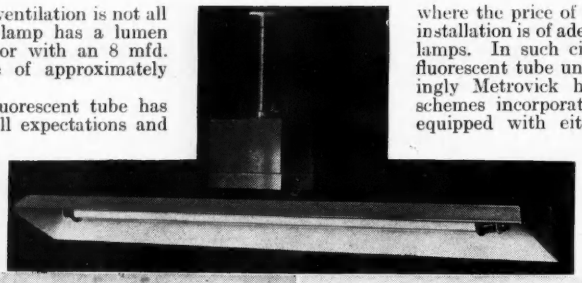
Benjamin "R.L.M." and (above) Wardle "Workslite" reflectors. Left: Verity "Verikool" reflector

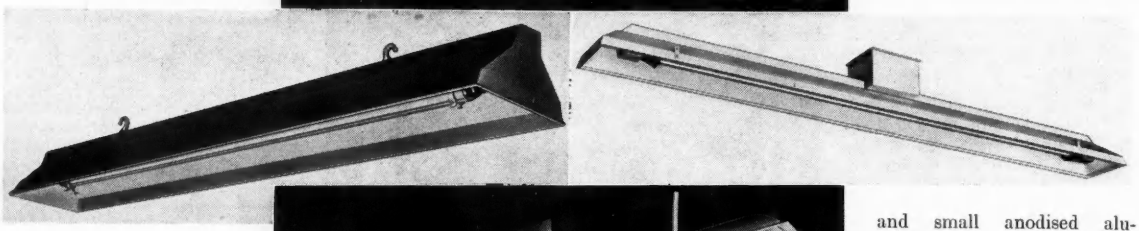
For general lighting purposes this can usually be carried out by an arrangement of dispersive fittings, but each installation, however, has its peculiarities, and for this reason scientific application of principles by specialist engineers is undoubtedly necessary. Besides the choice and arrangement of fittings another major problem is the selection of a suitable light source. Mercury vapour electric discharge lamps are highly commendable for most industrial purposes on account of their efficiency (38-45 lumens per watt, according to the wattage). The increased visual acuity which their use ensures as compared with tungsten lamps is a great asset, while the fact that discharge lamps are almost entirely deficient in red rays is a definite advantage in many industrial processes such as steel machining work. Fluorescent electric discharge lamps which have practically the same efficiency as ordinary discharge lamps or a combination of discharge lamps and tungsten lamps will, incidentally, remove the livid appearance imparted to the human face by the discharge lamp.

The need for high intensities required in producing fine detail work with high accuracy has made local lighting increasingly applicable, but this must always be supplementary to general lighting, and, moreover, the brightness at the working level must not be more than ten times that of the surroundings or a dangerous tendency to eye strain will be created. Especially useful for high intensity local lighting as well as for general lighting in certain situations is the new 5-ft. mains-voltage fluorescent tubular lamps which six of the leading lamp manufacturers (the G.E.C., B.T.H., Edison Swan, Siemens, Crompton, Philips and Metrovick) introduced early this year. So near to daylight is the colour of the light emitted that operatives find it extremely pleasant to work under. Colour discrimination is very good and fine detail easily distinguishable. At the same time the surface brightness is low, making it possible to utilise low mounting heights for high intensity local lighting. Because of the linear construction, the heat radiated is dissipated over a wider area than usual for a tungsten or ordinary discharge lamp of the same wattage. This is a particular advantage for local lighting

in blacked-out factories where ventilation is not all that might be desired. The lamp has a lumen output of 2,800, a power factor with an 8 mfd. condenser of 0.9, and a life of approximately 2,000 hours.

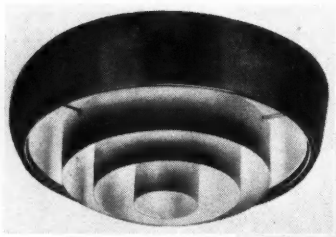
The reception which this fluorescent tube has been accorded has exceeded all expectations and manufacturers have been hard pressed to keep up with their orders. The position is, however, improving, and one company at least tells us that it now has considerable stocks available. As already mentioned, the tube is at present available only in 80-W sizes but it is safe to say that but for the war the production of smaller wattage tubes would now be an accomplished fact.

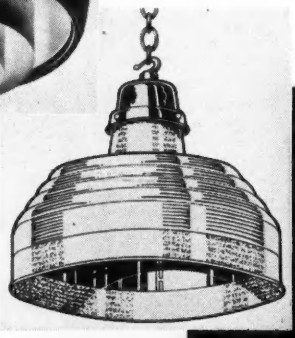




Four types of reflectors for the new 80-W fluorescent lamps made by the G.E.C., Siemens (left), Linealux (right) and Metrovick (top)

The coming of this fluorescent tube of unusual size has, of course, created a demand for special fittings to house it. These are now available from many manufacturers, including Siemens, B.T.H., G.E.C., Crompton Parkinson, Metrovick, Wardle, Edison Swan, Harcourts, Linealux and Troughton & Young. Models have been developed to suit all requirements, but simple heavy-gauge sheet steel units of either distributing or dispersive type suitable for chain or conduit suspension, meet most requirements. The control unit for the tube, consisting of a choke, thermal switch and condenser, is frequently mounted as an integral part of the fitting. Single units are generally used, but Edison Swan have recently brought out a two-lamp fitting for general lighting, while the Harcourt "Harfleur" range includes units accommodating as many as six lamps.





Troughton & Young "Louvrelux" fitting and (right) the G.V.D. "1701" direct lighting unit

An interesting adaptation of the Ediswan "Industra" unit which, incidentally, has been redesigned, is a portable reflector developed to meet the demand of aeroplane manufacturers for illuminating the sides and undersides of aircraft undergoing erection or repair. The reflector is mounted on tubular supports with rubber wheels. A weighted base houses the control gear, and wires are enclosed with tubular supports. The tube is flexibly mounted in the reflector, which is fitted with "Armourplate" front glass. For factories where the blacking-out of north sky roof lights has introduced a depressing effect, a new B.T.H. "Mazdalux" unit utilising the new fluorescent tube seeks to reproduce artificially the effect of a north sky roof light. Each roof light or laylight consists of a glazed framework housing up to eight tubes, together with the control gear, and the units may be used either as the only sources of artificial light or to supplement localised lighting.

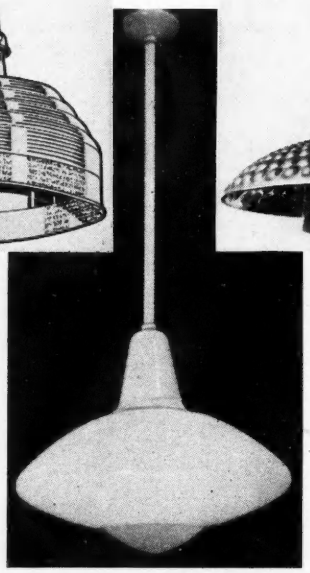
While the fluorescent tube is ideal for most tasks requiring an elongated light source, there are, of course, many factories where the price of electricity is low and the wiring installation is of adequate capacity for metal filament lamps. In such circumstances the expense of the fluorescent tube unit may not be justified. Accordingly Metrovick have recently completed several schemes incorporating special indirect units, each equipped with either two 150-W or two 200-W pearl lamps. The fitting consists of a shallow canopy 5 ft. long and 2 ft. 6 in. wide, finished in matt white inside to ensure maximum diffusion. Glare shields are provided and small anodised aluminium cups are clipped on to the lamps to reflect light on to the inner surface of the canopy. This fitting is now used extensively in American factories and an illumination of 30-40 ft.-candles is readily obtainable. While each indirect unit is separate, it is so made to form part of a continuous canopy of any length by simply butting the required number of units together, end to end.

With regard to the various fittings for discharge lamps, though there have recently been no major improved developments in design, minor improvements, intended to increase efficiency, reliability, safety and ease of wiring are constantly being made, while the practice of incorporating the necessary choke in the reflector housing, as, for example, in the Crompton "Omni-choke" unit, is becoming more general. This arrangement eliminates the necessity for wiring on site between reflector and choke.

An interesting "Eleco" innovation (Engineering & Lighting Equipment Co.) is the application of street lighting principles to industrial lighting.

Geisel "Day-Spect-Ray" and (left) Marley colour-correcting reflector units

In the "Duobeam" fittings, prismatic plates of special design are incorporated, the actual prisms being in two parts so as to provide the requisite cut-off. The upper set of prisms reflect the light upwards on to the overhead vitreous enamelled reflector and then on to the working plane. The distribution curve shows that the light extends over a very wide area, and that immediately under the fitting the candle-power falls sharply—a very desirable feature since it ensures even distribution and avoids the high concentration found beneath the ordinary circular type of fitting. The horizontal distribution is sufficiently extensive to permit spacings up to 2½ times the mounting height. Two fittings deal with the full range of mercury and sodium lamps.

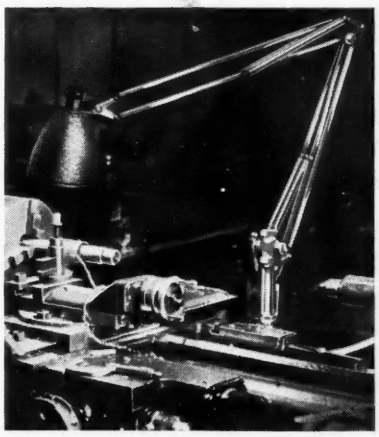


Osler & Faraday unit

Most manufacturers now make reflectors suitable, perhaps with slight modification, for either gasfilled or discharge lamps. Taking either a 400-W mercury or a 1,000-W gasfilled lamp, a new "Workslite" reflector has just been designed by Wardle especially for use in armament factories. The fitting is intended for chain suspension, and comprises a cast-iron anti-condensation box with ventilated cowl. The goliath lampholder is wired to the anti-condensation

box with special heat-resisting asbestos braided cable, while the canopy and reflector are vitreous enamelled steel, the reflector being detachable over the lamp. The Benjamin "Glassteel" is another example of a fitting suitable for either tungsten or discharge lamps. As it is provided with a special high-efficiency diffusing glass globe, it gives soft shadows and maximum visibility, but minimises bright reflections.

Whether equipment is intended for a tungsten or discharge light source, or a combination of both, developments in design usually result from constant attempts to improve the performance of lighting units which have a known method of application to a given visual task. Examples of such development are well typified by the range of B.T.H. "Mazdalux" low-temperature reflectors, improvements to which have been made over a period of years. Each development is comparatively small in itself, but the reflectors to-day have been so improved as to make the current design almost an entirely new reflector compared with those produced some years ago.



Terry "Anglepoise" lamp

Increased safety is the object of a large number of modifications in design. A new Simplex over-lamp dispersive reflector, embodying a cool wiring chamber and instantly detachable reflector, incorporates many important features ensuring mechanical and electrical security together with high efficiency and simple maintenance. Another new over-lamp reflector, made by Wardle for use with 300- or 500-W gasfilled lamps, has already been installed in many thousands in munition and aircraft factories. Safety of a different kind, namely in air raids, is behind the tendency to eliminate glassware wherever possible. In this connection the Ward & Goldstone and Z Electric moulded shades have much to recommend them for certain local lighting requirements.

The question of heat generated by lamps in the sleeves of industrial reflectors has long been a matter of concern to the electrical industry, but it was not until the advent of discharge lamps that the cool-wiring top became a real necessity. It has always been possible to add devices to the top of fittings and thus protect the insulation, but at the same time this adds further to the complication and expense of installation. In the Verity "Maxlume Verikool" top there are no screws, &c., to be assembled, and the only tool required to connect this fitting is a small screwdriver. The sleeve of the fitting is in two parts, between which is fitted an aluminium-finned ring or heat-dissipating body, which acts as a cooling chamber immediately above the lampholder. Specially enlarged apertures in the necks of the Holophane heavy-duty reflectors also ensure maximum ventilation.

Saving in time and cost and the elimination of the danger of overheating are also aimed at in the special terminal tops with which most of the "Eleco" reflector units are now being fitted. These are sent out ready wired with the cables connected to two insulated bakelite terminals. A novel detachable top connecting socket fitted to the "421" series of Elm Works reflectors, greatly facilitates wiring, while besides safety and easy wiring features, the Revo "Saferlite" units have the advantage of being so constructed that the reflector portion, together with the lamp, is instantaneously detachable for cleaning. Removal of the reflector without disturbing the lamp is also possible in the Revo "Passalamp" series, while in the G.E.C.'s range of fittings provision is made for easily detaching both lamp assembly and reflector, a locking device being incorporated to avoid accidental removal. These facilities for easy cleaning are of the utmost importance, since no fittings will give the desired intensity of lighting for long without regular attention. The periods at which cleaning should be carried out depends, of course, on the class of work being undertaken, but four weeks is the usual practice. Incidentally, every factory should have a light meter to enable the illumination at any part to be checked.

As already indicated, developments in factory lighting technique demand not only quantitative but also qualitative improvements, and considerable attention is now being paid to colour correction. Because eye-strain is thereby eliminated, this is of general benefit to the health and efficiency of the workers, and besides being essential for certain manufacturing processes, is now of especial importance in severely blacked-out factories, where somewhat disturbing shadow effects are often produced by attempting to augment low-intensity daylight.

Methods of achieving colour-corrected light which blends readily with daylight are various. In the fluorescent lamps the powder with which they are coated acts, of course, as the corrective agent. Some manufacturers achieve the desired object by means of blue lamps or by utilising blue glass filters in conjunction with ordinary tungsten lamps. Wardle, for instance, supply special visors for fitting to their units. Filters are also fitted to a new 15-in. diameter G.V.D. louvred unit taking 100-500-W lamps specially designed for general industrial lighting. The louvres are so arranged that direct view of the source of the light is impossible from practically all angles.

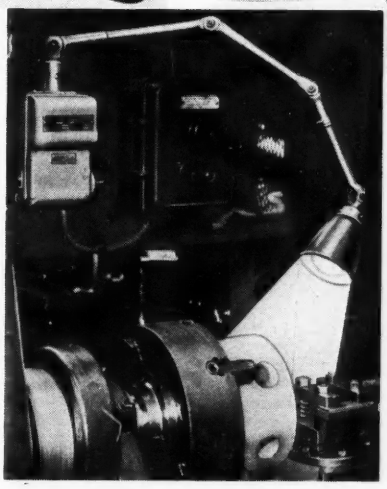
The use of filters, however, has two disadvantages. The absorption of light is exceedingly high, while the process eliminates practically all the red-yellow rays and produces a light which is definitely blue, this often being further removed from natural daylight on the blue end of the spectrum than the original source of light is from the red end. Consequently, several manufacturers, including Holophane ("Correctalite"), Geisel ("Day-Spect-Ray") and Marley have turned their attention to securing the correction by means of specially designed reflectors. The loss of light output by this method is negligible, while the increase in colour definition more than offsets the slight decrease in lumen output. Actually an average increase of about 40 per cent. in the light intensity as compared with the illumination utilising filters can generally be expected, with a consequent corresponding saving in electricity consumption. Moreover, the corrective properties of the reflectors are permanent and not liable to depreciation by heat or age.

Many of the larger aircraft and other factories appear to show a preference for securing colour correction by means of mixed mercury discharge and metal filament lighting. This arrangement has the advantage that, should the electricity

"Ediswan Industra" (left) and Peterborough "S.2" (below) adjustable fittings

Electric Depôt low-voltage unit (left) and Electricity Services "Invisaflex" model (below)

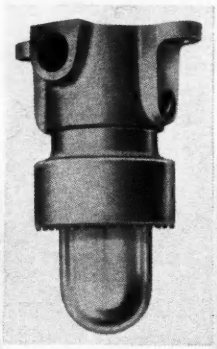
B.E.T. low-voltage transformer unit with Crompton lighting unit

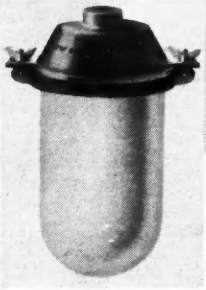


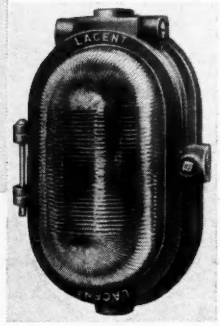
Foster lighting transformer unit

supply be momentarily interrupted, the filament lamps will relight immediately, whereas the mercury arc takes a few minutes to restrike. The actual mixing presents many difficulties if a thoroughly satisfactory mix is to be obtained, a haphazard arrangement resulting merely in an unpleasant and patchy lighting effect. Rowlands have made a study of the problem and the "Realite" balanced light principle has been developed to give three different grades of colour correction according to the class of duty—the "commercial mix," the "high mix" and the "super mix."

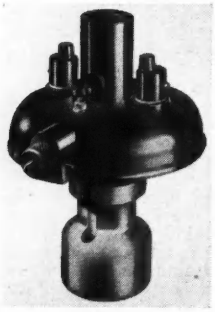
Metropolitan-Vickers, who have carried out large installations for the aircraft industry, have achieved considerable success using separate reflectors for each lamp in a symmetrical layout. To achieve uniformity of colour rendering, the contour of the reflectors, the positioning of the lamps and spacing of the units is of the greatest importance. Another method of improving the quality of the light and at the same time increasing the intensity is to be found in the Siemens "Sieray-Dual" lamp, which consists of a mercury lamp in series with a tungsten lamp, all in one bulb. No choke or condenser are required and the lamp can be plugged directly into an ordinary goliath holder. The 500-W model is claimed to give about 50 per cent. more light than a gasfilled lamp of the same wattage.



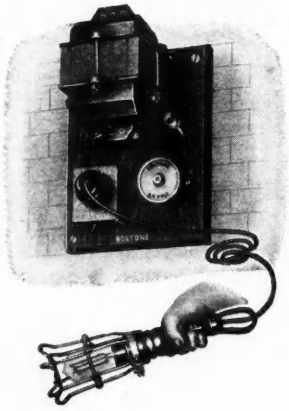




Left to right: "Mazdalux" well-glass unit, Walsall flame-proof fitting and Heyes "Lacent" fitting



Anti-heating terminal top fitted to most of the "Eleco" reflectors



Ward & Goldstone transformer with handlamp

Victor Iddon push bar lampholder

The need for high intensity localised lighting for certain processes is met by many different types of concentrating fittings, as well as by various adjustable units. Among the former models such as the Troughton & Young "Louvrelux," which incorporate louvres, are especially worthy of note, since the maximum light is directed where the higher intensities of illumination are required without producing glare. A new G.V.D. fitting in glass throws a brilliant light down on to the working plane, but has an opalescent neck which allows sufficient light to be transmitted to the ceiling to remove any impression of darkness. Several of the latest Osler and Faraday models are suitable for assembly or drawing office use. Before the war Zeiss Ikon fittings were much in demand wherever efficiency was the aim. With the cessation of supplies from Germany, Silux, Ltd., has commenced the manufacture of units identical in design but entirely British made.

Adjustable units made by such manufacturers as Herbert Terry ("Anglepoise"), M.E.M. ("Memlite"), Mek-Elek, Peterborough Extensible Lamps, the Electric Depôt, Edison Swan, Crompton Parkinson, and Electricity Services ("Typerlite") are much in demand. All have their own particular merits but their purposes are identical. Most of the fittings are too well-known to need comment, but the new "Invisaflex" model just brought out by Electricity Services is designed so that the flex is completely protected throughout the whole length of the fitting. All the Electric Depôt's units have been redesigned during the last eighteen months. For these adjustable fittings and also for various fixed and inspection lamps it is often thought desirable for safety's sake to install transformer units, as supplied by Foster Transformers & Switchgear, Igranic ("Lo-Vo-Lite"), Crompton Parkinson, G.E.C., Heayberd, Ward & Goldstone, and Concordia. Among the various hand lamps now available may be mentioned the new "Super Gripper" (British Central), which has no exposed metal anywhere; the Ward & Goldstone "Cliptite" and "Stayput" (rubber suction attachment); and the wide range of "Nettle" models (Victor Iddon).

The lighting fittings for use under special conditions and in special positions are, of course, being constantly developed and improved. There are, however, so many that we can do no more than mention a few to which our attention has been particularly drawn—the Wardle flame-, acid- anl dust-proof units; the Walsall watertight fittings; the Revo flameproof models; the Iddon ventilated bakelite batten holders; the R.E.A.L. weathertight fittings; and various types of bulkhead and dust-tight fittings made by Heyes, Walsall and Wardle, which, incidentally, are specially suitable for A.R.P. shelters.

Space prevents reference to special units for external A.R.P. lighting for entrances, loading bays, etc., but details of these have already been published in the ELECTRICAL REVIEW from time to time during the past few months. Among the manufacturers concerned are Best & Lloyd, Holophane, Metrovick, G.E.C., B.T.H., Edison Swan, Simplex, Revo, Siemens and Benjamin.

For the convenience of readers the following is a list of the addresses of companies referred to in the above article:—

Benjamin Electric, Ltd., Tariff Road, N.17.
Best & Lloyd, Ltd., Wattville Road, Birmingham.
British Central Electrical Co., Ltd., 6, Rosebery Avenue, E.C.1.
British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.
Concordia Transformer Co., Ltd., 94, Railway Terrace, Rugby.
Crompton Parkinson, Ltd., Electra House, W.C.2.
Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.
Electric Depot, Ltd., Pritchett St., Birmingham.
Electricity Services, Ltd., 86, Cannon St., E.C.4.
Elm Works, Ltd., Summerstown, S.W.17.
Engineering & Lighting Equipment Co., Ltd., St. Albans.
Foster Transformers & Switchgear, Ltd., Apex Works, S.W.19.
Ernst Geisel, 160, New Cavendish Street, W.1.
General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.
G.V.D. Illuminators, Ltd., Aldwych House, Aldwych, W.C.2.
Harcourts, Ltd., 1, Kean Street, W.C.2.
F. C. Heayberd & Co., Ltd., 10, Finsbury Street, E.C.2.
Heyes & Co., Ltd., Water-Heyes Electrical Works, Wigan.
Holophane, Ltd., 110, Elverton Street, S.W.1.
Victor H. Iddon, Ltd., 27, Blackfriars Street, Manchester.
Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.
Linealux, Ltd., 371, City Road, E.C.1.
Marley Light Co., Ltd., 119, New Cavendish Street, W.1.
Mek-Elek Engineering, Ltd., 16, Douglas Street, S.W.1.
Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.
Midland Electric Manufacturing Co., Ltd., M.E.M. Works, Reddings Lane, Birmingham.
Osler & Faraday, Ltd., 89-91, Newman Street, London, W.1.
Peterborough Extensible Lamp Co., Ltd., 100, Princes Street, Peterborough.
Philips Lamps, Ltd., Century House, Shaftesbury Avenue, W.C.2.
Revo Electric, Ltd., Tipton, Staffs.
Rowlands Electrical Accessories, Ltd., Hockley Hill, Birmingham.
Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.
Silux, Ltd., 47, Berners Street, W.1.
Simplex Electric Co., Ltd., Oldbury, Birmingham.
H. Terry & Son, Ltd., Redditch.
Troughton & Young, Ltd., 143, Knightsbridge, S.W.1.
Veritys, Ltd., Aston, Birmingham.
Walsall Conduits, Ltd., Excelsior Works, West Bromwich.
Ward & Goldstone, Ltd., Frederick Street, Pendleton, Manchester.
Wardle Engineering Co., Ltd., Elsinore Road, Trafford, Manchester.
Z Electric Lamp & Supplies Co., Ltd., 21, Newman Street, W.1.

Lift Repair Precautions

SOME useful hints to secure safety in the repair or inspection of lifts are quoted from a Canadian source in the *Bulletin* of the National Safety First Association. They are:—

(1) Wear close fitting clothing.

(2) Before starting a job which does not require the cage to be moved, shut off all sources of power, and make absolutely certain that no one can turn it on inadvertently.

(3) If the work requires the cage to be moved, station a reliable man in the cage with positive instructions to move it only according to your orders.

(4) Watch for moving objects, *e.g.*, the balance weight, and for projections. Watch also the overhead clearance.

(5) Never permit the hoist to be used for carrying goods or passengers while inspection or repairs are in progress.

(6) Before repairing or inspecting electrical equipment, see that the main switch is open. If you withdraw the fuses and put them in your pocket, you will ensure that no one can switch the current on while you are at work.

(7) Before working in the pit at the bottom of the well, make sure of the clearance, or put in blocks to prevent the cage coming too far down. Watch also for the counterweight when the hoist is at the top of its run.

LIGHTING RESTRICTIONS

Relevant British Standards Reviewed

By J. F. Stanley

LAST autumn various emergency specifications were issued by the British Standards Institution without time for profound theoretical investigations. More recent investigation should permit better quantitative definition of wartime lighting requirements, which in turn should eventually lead to further revision of the September, 1939, Lighting (Restrictions) Order if it is retained for any considerable period.

The Order was revised on January 19th and the police are now exercising special powers, the effect being to revoke or amend some clauses. For instance, the clause permitting shop window lighting has been revoked and the stipulations regarding the extinguishing of lights on receipt of an air-raid warning have been modified. The police now require certain lights to be extinguished *before* the receipt of a public air-raid warning, and it is not lawful for any light to be displayed inside a building in such circumstances that any illumination is visible from outside. To meet this requirement, all doors, windows and other openings through which light might pass must be obstructed in some way. The September, 1939, BS/ARP 15 was confined to light-locks for shop entrances, but the February, 1940, edition was extended to cover entrances to all types of buildings. This was supplemented in July by BS/ARP 31, which deals with the principles of design of ventilator light-traps and their effect on ventilating efficiency. Typical examples of ventilator light-traps as applied to various types of openings are described and illustrated, primarily for factory and office buildings, but also adaptable to domestic premises.

Mr. Stanley, of the British Standards Institution

The first direct reference in the Order to a British Standard Specification occurs in Clause 7, which reads:—

"Except in such areas as may be specified by the Minister of Home Security, lights may be displayed for the lighting of any road, so long as the requirements of the British Standard Specification No. BS/ARP 37 are complied with, and so long as each lighting fitting is permanently marked with the British Standards Institution Mark described in the First Schedule to this Order, and the requirements of that Schedule are complied with."

Certified Fittings

Clause 9 states that private roadways may be lighted in the same way as public roads. At present eighteen manufacturers are licensed to use the B.S.I. Certification Mark on street-lighting fittings complying with the specification, and the number of fittings installed is of the order of a quarter of a million. This number is steadily increasing and in one provincial town alone 25,000 fittings are in use.

Regarding visibility from the air it is significant that although the police now have powers to enforce the extinguishing of certain external lighting before the sounding of a warning, these powers do not extend to interference with the street-lighting either before or during a raid.

Clause 4 of the street-lighting specification deals with mounting height and spacing, and was recently revised to allow flexibility in the planning of an installation. In certain circumstances the fittings may now be spaced as close together as 50 ft. instead of the original minimum of 75 ft. The mounting height and the type of fitting are still co-related with the spacing, however, in such a way as to maintain the same general level of illumination.

Next in interest from the point of view of B.S. specifications is Clause 12, which permits the illumination of signs indicating the positions or directions of first-aid posts, shelters, etc. The sign must be screened from above and so dimmed that, while clearly legible at a distance of 100 ft., it is inconspicuous at a distance of 250 ft. The legibility of a sign at 100 ft. depends to a certain extent on such variable factors as the eyesight of the observer, whether he is wearing his spectacles or not, etc.; also very largely on whether the observer's eye is "dark-adapted" or not. Clause 52 (3) of the Order tries to help matters by explaining that any reference to legibility, visibility, or inconspicuousness shall mean in the dark, in the absence of moonlight, fog, mist or rain, and when all lights in the vicinity are extinguished. Even so, there is room for differences of opinion between observers as to whether a sign conforms or not to the requirements of the Order. Therefore BS/ARP 32 (November, 1939) quantitively defined the brightness of the sign, by stating that the brightness as seen in any direction shall be as uniform as is reasonably possible, and the general level of brightness of the white symbols, legends and arrows shall be between the limits of 0.04 and 0.1 equivalent ft.-candle.

This specification went a long way towards providing a criterion for the elimination of signs which were obviously too bright, or not bright enough, but there was still room for argument and, furthermore, no definite instructions were given as to the way in which the signs should be tested photometrically for brightness, while many manufacturers and purchasers did not test at all. Last May, in a revised edition of the specification, the brightness of the illuminated portion of the sign was again more closely defined. The average brightness must still lie between 0.04 and 0.1 equivalent ft.-candle, but in addition the ratio of the maximum to the minimum brightness value obtained in accordance with the prescribed method of test must not exceed 15:1, and the ratio of the brightness values at any two adjacent test points on the sign must not exceed 3:1.

The revised specification is also more explicit about the amount and extent of any spilled light; "noticeable" light must not fall elsewhere than on the sign itself, and a quantitative photometric test is specified and described in detail. Briefly, the panel of the sign is marked off and divided into squares of 3-in. side, the illumination produced on the face of the sign is measured at the centre of each square, and the illumination values so obtained are converted to brightness values by multiplying by the average reflection factor of the white paint or other material used for the inscription on the sign. If a simpler direct brightness measurement were adopted it would be necessary for a sample of every sign bearing a different inscription to be tested. In effect it is the distribution of light from the fitting that is being determined. If this is satisfactory over the whole face of the panel and the reflection factor of the paint is also satisfactory, there is then a reasonable assurance that all signs of the same design and painted with the same batch of paint will comply with the specification.

Luminescent Materials

The specification also makes reference to the use of luminescent markings activated by lamps emitting chiefly ultra-violet radiation. The obvious advantage of this method of obtaining the necessary brightness is that owing to the absence of any appreciable visible light, there is no need for elaborate screening to prevent spilled light falling on the ground. The difficulty up to the present has been, however, that the luminescent materials themselves have been disappointing in their performance. BS/ARP 18 Fluorescent and Phosphorescent Paint (excluding radio-active materials) of December, 1939, as revised last July, contains much additional useful information. The two main luminescent materials dealt with are: (1) fluorescent which emit a useful amount of light only while they are being irradiated and (2) phosphorescent which continue to emit light after the source of irradiation has been removed. The second class is further divided into type (A) materials with a high brightness during excitation with "black" lamps; their brightness during the first few minutes after excitation has ceased is also high, but the duration of useful afterglow is not so long as that for type (B) materials of lower brightness, but the duration of their useful afterglow is longer.

The performance of fluorescent materials is defined in terms of the maximum effective brightness when a test sample is irradiated by a standard source. That of phosphorescents is characterised by the brightness decay curve as well as by the initial brightness of a test-sample irradiated. The standard source of ultra-violet radiation is a tungsten filament lamp

operating at 3,000 deg. K, and having a directional intensity of 1,200 candles. A 500-W Class A1 projector lamp complies closely with this specification. The luminescent surface under test is placed 3 ft. from the filament of the standard lamp, and the light is passed through a Wratten 18 A ultra-violet filter before irradiating the surface. A brightness gauge is described in detail.

An important feature of this specification is the introduction of the "*unit of effective brightness.*" The comparison of the brightness of differently coloured surfaces in terms of equivalent foot-candles is based on the assumption that the comparison is made at a brightness sufficiently high to ensure that the observer's eye is in a state of light adaptation. It is now becoming fairly generally known, however, that at low brightnesses the eye becomes progressively more and more blue-sensitive, with the result that the judging of the merits of differently coloured luminescent materials on the basis of their equivalent foot-candles does not give a true measure of their relative practical usefulness. The departure of the eye from a constant luminosity curve begins to take effect at a brightness of about one equivalent foot-candle. As the brightness is reduced, the eye becomes progressively relatively more blue sensitive and less red sensitive until a brightness of 0.0005 equivalent ft.-candle is reached, the rate of change being most pronounced between 0.2 and 0.001 equivalent ft.-candle. This shifting of the luminosity curve towards shorter wave-lengths at low brightnesses is called the "Purkinje effect." For brightnesses below 0.0005 equivalent ft.-candle, the eye has again reached a steady state with a constant luminosity curve and may be regarded as more or less dark-adapted.

Measurement of Effective Brightness

The basis of measurement adopted in BS/ARP 18 is the visual comparison of a surface with a white diffusing surface illuminated by light from a tungsten filament lamp operating at a colour temperature of 2,360 deg. K, the brightness of the white surface in equivalent ft.-candles being $\frac{\rho\ I}{d^2}$ where ρ is the reflection factor of the surface, I is the candle-power of the lamp and d is the distance (in feet) of the lamp from the surface. Any coloured surface judged by a normal observer to be equally bright is said to have an effective brightness of $1{,}000 \times \frac{(\rho\ I)}{d^2}$ units. The unit of effective brightness thus defined is therefore equal to 0.001 equivalent ft-candles for light having a colour temperature of 2,360 deg. K.

The "unit of effective brightness" was chosen to equal one-hundredth of one equivalent ft-candle for white light of a colour temperature of 2,360 deg. K, to avoid confusion between the two units and unnecessary decimal fractions in expressing the effective brightnesses met with in the present phenomena, and because an effective brightness of one unit can just be perceived by an observer practically immediately after he has been plunged from light into darkness.

The specification contains a warning that the use of this unit of effective brightness must be strictly confined to the statement of the final brightness as seen by the eye. This unit is not to be used as a basis of calculation for candle power, flux, or illumination, or applied to any other photometric calculation.

Vehicle Headlamps

Clause 17 of the Order defines an "authorised headlamp" as exceeding 7 W, emitting a white light to the front of a vehicle, and fitted with a mask so as to satisfy certain conditions. One of them is that the intensity of illumination on a vertical surface at any point 10 ft. from the lamp does not exceed 2.5 ft.-candles. There is clearly room here for differences of opinion regarding the practical interpretation of these requirements, owing to the fact that the light output of the masked headlamp will depend upon the voltage across the terminals of the lamp. There is no B.S.S. to guide manufacturers of headlamp masks, but if such a specification should ever be issued, its main object will presumably be to define the conditions under which the masked headlamp should be tested. There would appear to be two alternatives to choose from. The test could be made either at the rated voltage of the lamp (6, 12 or 24 V) or at the maximum voltage likely to occur across the lamp under running conditions (6.5, 13 and 26 V).

Clause 24 of the Order governs the use of lights on tramcars and BS/ARP 41 contains guidance regarding the design of a front lamp.

Clause 25 deals with the interior illumination of public service vehicles. At any point at the level of any of the seats in the vehicle it must not exceed 0.1 ft.-candle, and at any point at ground level outside the vehicle it must not exceed 0.001 ft.-candle. A simple form of gauge for checking these low values is called for and BS/ARP 30 is under revision in this respect, and it will probably be amended to avoid the confusion which is felt by some to exist at present between the nominal values referred to in Clause 1 and the calibration values referred to in Clause 4.

Part IV of the Order relates to shop window lighting and advertising displays. The December, 1939, BS/ARP 35 for illuminated display cabinets was due for revision and extension so as to cover shop window lighting and advertising displays in general, but the present total prohibition of this form of lighting makes the future of this specification uncertain.

Outdoor Working Places

Part V relates to the lighting of railways, docks, waterways, &c. Clauses 45 (e) and 46 (i) permit an intensity at ground level not exceeding 0.002 ft.-candle. Fittings are described in BS/ARP 16 of September, 1939, which is at present under revision with a view to providing a new fitting for use at a spacing/height ratio of 2:1.

Clauses 45 (1) and 46 (v) make provision for the use of "such other lights as may be authorised by or on behalf of the Chief Officer of Police . . . ." presumably referring to levels, amongst others, of 0.02 and 0.2 ft.-candle, fittings for which are described in BS/ARP 20/21. Clause 50 describes how light may be displayed from hand-lamps, or hand-torches, so long as (*a*) the former comply with BS/ARP 3 and (*b*) the latter are dimmed by two sheets of tissue paper, or their equivalent. BS/ARP 3 provides for a hand-lamp of such design that when carried in the normal position the light is projected downward and is of an intensity not exceeding 1 c.p. in any direction. This amount of light is a good deal more than that given by the normal pocket torch fitted with two sheets of tissue paper, but this additional light is permissible for the reason that there is little likelihood in normal use of the light being thrown in a horizontal or upward direction. The hand-lamps supplied to air raid wardens are designed to comply with BS/ARP 3, and there is no legal reason why this type should not also be used by the general public.

There are several other B.S. specifications of interest to the electrical industry in connection with A.R.P. lighting, *e.g.*, those relating to the interior illumination of shelters, but as they do not bear directly on the Lighting (Restrictions) Order, they are outside the scope of the present notes.

Artificial Skylights

THE August issue of *Light and Lighting* (the official journal of the Illuminating Engineering Society) contains some interesting notes on the use of artificial skylights in works. It is pointed out that the advantage of such an arrangement in a blacked-out factory, of relieving the overhead gloom caused by the exclusion of daylight, is only one of its merits. At least equally important is its function of providing large areas of mild brightness which are often of great benefit in the inspection of polished surfaces. This effect is often mentioned as a somewhat specialised problem in industrial lighting, associated with certain specific processes (such as the examination of tin sheets), but it enters into ordinary visual operations to a much greater extent than is commonly imagined.

An instructive case wihch recently came under notice was that of an office occasionally used for draughtsmanship. Although relatively deep this office, situated high up, was well lighted by windows occupying practically the entire wall facing the street. The natural lighting for over three-quarters of the room was usually fully adequate, but artificial light (from a semi-indirect unit under a white ceiling) was occasionally necessary in the part of the room most remote from the window. It had been observed, however, that workers in the centre of the room were inclined to turn on the artificial light at times when it was apparently quite unnecessary. Investigation revealed that this was due solely to difficulty in making out engraved figures on a steel or brass background—more especially protractors, necessarily laid on the horizontal drawing and dependent on reflection of light from above. The small figures could be seen with ease when a reflected image of the illuminated ceiling was obtained, but they were most difficult to make out by the aid of the high daylight illumination received at an oblique angle from the window.

The effect is more or less in evidence whenever operators are at work on polished material, and explains in some degree the persistent preference for local adjustable lights which the worker can manipulate so as to get the precise reflection he requires. If the stationary overhead units are sufficiently extensive, or if a well-lighted ceiling is available, this should go far towards satisfying the worker's needs in this respect, though there remains the traditional affection for a source of light under personal control, chiefly characteristic of the older workers. Hand work on metals is not infrequently done on benches round the edge of a workroom, the centre of which is occupied by machinery. One can readily understand the demand for full access of daylight at these benches. This, no doubt, explains why one so often sees the upper parts of windows permanently blacked out and the lower areas left free during the daytime, though, theoretically, it is the upper portions of the windows which are most valuable for admission of daylight.

LIGHTING IN THE HOME

Counteracting Black-out Depression

By M. Forrest

A FEW months ago the majority of people, when asked what they considered to be the greatest annoyance caused by the war, unhesitatingly named the "black-out" with its attendant depression and nerve strain. The last few months of sunshine and the long hours of daylight have served to push this unpleasant memory into the background but, with the approach of autumn, we have once more to face the problem and, if it is realised to be a problem which can and should be solved, much can be done to lessen the trials of the coming winter and to sustain the spirit of the country.

So far as domestic lighting is concerned the solution is a simple one and the bad lighting of last winter was due to the fact that the subject was approached from the wrong angle.

Little preparation had been made before the declaration of war to screen windows effectively and then the shortage of blinds and the poor quality of black-out material meant that many experiments were tried which resulted all too often in a visit from the air-raid warden and a consequent reduction of wattage and heavy shading of lamps.

The threat of rationing was also responsible for a general lowering of the standard of lighting and, though rationing was not introduced after all, that poor standard has been allowed to remain. The result of this bad lighting was far more serious than was generally realised and was undoubtedly the cause of much of the depression and nerve strain of which we heard.

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This is borne out by the fact that, as the hours of black-out decreased, one heard less and less of war depression and to-day, when we are facing the most trying and difficult period in our history, morale has never been better and cheerfulness is the keynote of the whole country. The Government has impressed upon us that anything which tends to sustain this spirit is work of national importance and therefore no effort should be spared to lighten the inconvenience and strain inseparable from the long winter months ahead.

Other writers are dealing with the subject of street and factory lighting and much research has been done in this direction, but one wonders if the importance of domestic lighting has yet been fully appreciated. It is the simplest of all the lighting problems of wartime and yet it is one of the most important, for the effects of bad lighting are both material and psychological.

Lighting Service Bureau

A good example of a well-lighted apartment

It would be of interest to know the number of accidents which occurred in homes last winter due to bad lighting, for the number must be considerable and the sum spent on replacing broken crockery would probably buy many "Spitfires"! It is well known that badly lighted stairs and steps are a danger to life and limb and yet many staircases were left in darkness because the landing windows had not been blacked out. In the kitchen department too it has been found that breakages increase as the light is decreased, particularly at the sink, and yet the common practice in kitchens last winter was to put a heavy paper or card shade on the light rather than cover the window effectively.

Dangerous and expensive as the results of these efforts proved to be they were but small when compared with the ill-effects of eyestrain caused by reading and sewing in a dim light and with the depressing effect due to the general gloom.

To return to a gloomy, badly lighted house after a cold, dark journey through the black-out is the "last-straw" which breaks the worker's heart and temper, whereas the welcome of a cosy, cheerfully lighted room is a tonic and, as such, has a definitely beneficial effect on health. Appeals have already been addressed to the women of the country urging them, by their own cheerfulness and courage, to sustain the splendid morale of the workers, and it would be a definite advantage if they could be made to realise that nothing contributes so greatly to the comfort of a home as bright cheery lighting, and that nothing is more dangerous to health and eyesight, or more depressing, than bad lighting.

The average housewife, though interested in and knowledgeable about colour and decoration, has given little thought to the question of lighting, and has no idea of the ills which result from neglect of the subject. Much educational work has been done already in this direction, but far more is still needed, and it might be well timed at the present moment, when health is of such importance to our war effort, to present the subject to them from this angle. In doing so guidance should be given on such points as the best and cheapest method of blacking out windows, the cost of increased lighting and simple rules for the position of lamps.

The first point to be dealt with is "blacking out," as this is an essential before lights can be increased. Those with ample means can put the work in the hands of a good firm whose best method is to fit dark blinds against the windows, leaving the original curtains and pelmet in place. This is entirely satisfactory as there is the double protection of blind and curtain and, if the edges of the curtains are tacked to the wall and the pelmet is a good fit, not even a chink of light shows. The only point to note here is that the blind material must be light proof and not porous as much of it was last winter. Should there already be blinds of this porous material in position they can be made light-proof by painting them with a dark, quick-drying paint and allowing them to dry before rolling up. This paint lasts well and fills all the holes in the material.

Most people, however, cannot afford blinds which to-day are an expensive luxury, but there is a simpler method and one which only costs a few shillings. It is not satisfactory to line curtains with black-out material and use them without a blind, as the light shows through sides, top and centre opening. The best method is to leave the original curtains in position as decoration and to place a black-out curtain as close to the glass as possible. Black "Italian" material 2s. 11d. a yard, 50 in. wide, is excellent for this purpose as it is light-proof and not at all bulky.

Two curtains should be made for each window, long enough to allow 2 in. to rest on the sill and wide enough to meet easily in the centre. The curtains should not be hung on rings as they leave gaps at the top, but a wide hem should be made and through this an extending curtain wire threaded through and fixed as close to the glass as possible using the hook ring fixtures which are supplied with the wire. This wire should be supported in the centre by a hook to avoid sagging and the sides of the curtains should be fixed to the

AIR-RAID SHELTER WIRING

Dangers Lurking in Safe Places

By J. J. Lesser

ALL over the country in every town, village and hamlet, air-raid shelters have been and, in fact, are still being erected. Some of these take the form of a strengthened room within a house, whilst a very great many others have been constructed in gardens, fields and public places. Much has been heard about the necessity for making these shelters habitable during the period of use in the emergency for which they have been provided. We have been told that the intending occupants should see to it that they are provided with means for occupying their time, such as card games, books and so on. We have also heard a good deal about the difficulty of deciding whether to stay in a strengthened room within a house or to take the risk in the winter of colds and pneumonia through going into an outdoor shelter constructed either above or beneath the ground.

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It is obvious, therefore, that in order to render these shelters more suitable for the purposes for which they have been provided, some provision should be made for artificial lighting and warming. Where the construction of the shelters has been entrusted to a reliable contractor there can be little doubt that the arrangements for electric lighting and warming will be carried out with strict regard to safety and efficiency, but it is becoming known that in order to minimise expense some of the work is being carried out either by amateurs or by others who are tempted to avoid in some respects the strict requirements of the Wiring Regulations of the Institution of Electrical Engineers and the supply authorities concerned. It would be appalling if people rushed to their air-raid shelters for protection against the enemy and it was subsequently found that some had been injured, and perhaps killed, as a result of their own ignorance, negligence or parsimony through the improper electric wiring of the shelter.

In the introduction to the Eleventh Edition of the I.E.E. Regulations it is pointed out that they "are not intended either to take the place of a detailed specification or to instruct untrained persons," and contractors themselves should remember that the regulations contain "various methods of carrying out the electrical equipment of buildings . . . . and in order to guard against the risk of fire and shock, the method selected should be suitable for the voltage, the atmospheric conditions, the size of the installation and the type of building."

In many branches of the national organisation it is impossible under war conditions to exercise that high degree of supervision so necessary to protect certain people from themselves. The importance of this matter may be ascertained from the actual experience of some electrical contractors. "All too frequently," writes one of them, "have I seen the domestic shelter in which a bit of wire has been slung across from the house to give light and heat in the shelter. These wires are usually of the v.i.r. type and at the house end they terminate in a b.c. adaptor which is left ready to plug in to the kitchen light when the bulb is removed. The light in the shelter is wired up without any regard to earthing or bonding." The wiring of such an installation has been known to have been carried on to an automatic pump which is necessarily very well earthed because the whole structure is immersed in the pump water. The user, however, leans on the pump to remove the bulb from the batten holder so that he can plug in a kettle or use a light and heat adaptor to supply a lamp and a kettle at the same time. The risks attendant upon such an arrangement are obvious to any electrical contractor, but when they were pointed out to the user the only response was that there were many such installations working satisfactorily for the purpose required and that anything more expensive was unnecessary.

Inadequate earthing is considered very much more dangerous in the case of electrical installations in air-raid shelters than those in private houses. In one particular case recently, an electrical contractor when inspecting an installation which had been carried out by the owner of the shelter found that the conduit had been bonded quite efficiently throughout and finally connected to a rain-water pipe which made no direct contact to earth unless water was continually running out of it; the installation itself was comparatively good for an amateur and after explanation an earth spike was driven into the ground to provide a sound earth for that type of installation. In another case perfect conduit joints were made, but bushes at the end of conduits had been omitted and the cables were bending on the rough edge of the conduit causing damage to the insulator. Between the house supply and the shelter v.i.r. cables were used in screwed welded conduit with ordinary inspection fittings and laid about 6 in. under the ground; no attempt had been made to set the 30-ft. length of conduit, and the inspection elbows provided were simply an inlet for water.

One cannot usually go into a chemist's shop and buy poisons

Lighting in the Home (*Continued from preceding page*)

window frame with drawing pins. When this is done, at a cost of a few shillings, the black-out is complete.

The second point which can never be stressed too often is the small amount of electricity used in lighting, and this is best illustrated by the examples which are in constant use, such as: "For the cost of one match a 40-W lamp gives nearly 40 minutes' light" or "For the cost of one cigarette (pre-war price) a 40-W lamp burns for 13 hours."

In spite of all the efforts which have been made to educate the public on this subject the general impression seems still to be that light is expensive and that if it is necessary to economise for the war effort lighting must be reduced. If this impression is not corrected, there may be a still further fall in the standard of domestic lighting with disastrous results to health and eyesight. People should be made to realise that, whatever other economies are necessary, lighting should be increased in wartime rather than decreased, for it is the commodity from which one gets the greatest benefit for the least cost.

The third point on which advice would be helpful covers the type of fitting which is most suitable, the correct position for fittings and lamp, and, above all, the elimination of glare. It might be pointed out that whereas a strong lamp in an enclosed glass ceiling fitting is best for kitchen and bathroom, because it casts no shadows, a bright but pleasantly shaded light is best in living rooms, as it is warmer and more restful.

One light alone in a room is never satisfactory for reading or sewing, and therefore while the general lighting of the room should be warmly shaded, individual reading lamps should be placed about the room in such positions that, as far as possible, the light shines over the shoulder of the reader and not in his eyes.

All too often the question of glare is not understood, and one finds a bare unshaded lamp hung in the centre of the room. In such cases, no matter how powerful the lamp may be, the glare caused by it is more trying to the eyes and reading a greater strain than if a too weak light were used. The eye is a sensitive organ—so sensitive that the pupil closes the instant direct light falls upon it, and because this is not fully realised people are puzzled to know why, though the wattage is sufficient, they get eyestrain and headache. The golden rule in lighting might well be: "Light should fall on the work and the eye should be protected from glare."

In this short article it has not been possible to discuss the method of correct lighting, but much excellent material is already in print on the subject for those who are sufficiently interested to follow it up. It has been attempted here only to suggest that the subject is not of limited interest but is one which has a bearing on the welfare of the whole community.

Sunshine and light have always been synonyms for cheerfulness and happiness, and we are told that to-day the cheerful spirit is the victorious spirit. Is it not therefore appropriate that we should choose light as the weapon with which to defeat the gloom of the winter black-out and that our slogan should be: "Go to it"—and light the way."

or dangerous drugs without a police certificate or a doctor's prescription, and even then the purchaser has to sign a register. In this matter certain responsibilities are thrown upon the chemist who sells. The poison or drug presents no danger so long as it stays on the shelf in the shop, but it is an actual or potential danger so soon as it passes into the hands of a member of the public. Is there not some similarity here in the practice of the large multiple stores selling very cheap electrical fittings of all description? The practice is now being seriously called into question, as amateurs are thereby encouraged to attempt to carry out wiring installations in the hope that when they have finished "the lamp will light."

These fittings, like the poison or drug, are harmless while in the shop; the dangers flow from their improper use. An electrical contractor has actually found extensions to installations for the purpose of feeding a 5-A heater carried out with bell wire flexible cord either exposed or housed in conduit and quite frequently he has seen a pair of 1/18 v.i.r. cables installed for a 15-A heater.

Damaged Earthing Wires

Several paragraphs of the Regulations are devoted to the subject of earthing and it is obvious that great importance is attached to this matter. Even when earthing conductors have been provided they must be maintained in a sound condition in order to ensure the protection required. It is on record that fatal accidents have occurred through the broken end of an earth wire touching a live conductor within the plug. In many private houses the wiring installations are very old indeed and have not been maintained in sound condition. When such premises change hands some re-wiring may take place, but generally speaking this expense is avoided and sundry extensions are made in a cheap fashion to the original installation, already in bad condition.

Very often these extensions are made without previous notification to the electricity supply undertaking concerned. Further tinkering with these installations by unqualified persons is really asking for trouble. It may seem easy enough to the amateur to make a hole in a wall and run a piece of flex through it into the air-raid shelter, but a disastrous fire resulting in loss of life once occurred where a hole in a wall was used for electric light wires, water and gas pipes. An investigation showed that the electrical service was on the negative side of a DC system and electrolytic action had taken place resulting in the perforation of both water and gas pipes. It was thought that the actual ignition of gas was probably caused by tracking sparks.

The question is what is to be done in order to ensure that air-raid shelters shall be safe against electrical accidents occurring through faulty wiring by unqualified and unscrupulous persons? Can it be said that supply authorities are already armed with sufficient powers which enable them to condemn the installation and insist upon certain changes under threat of immediate discontinuance of supply? If such powers are non-existent or, if they do exist, are inadequate, should the position be remedied? What steps, if any, can be taken to prevent unqualified persons erecting wiring to an air-raid shelter? It must be remembered that quite apart from the public shelters many private shelters are capable of housing a considerable number of persons.

Commissioners' Regulations

The Electricity Commissioners issue Regulations for securing the safety of the public and they provide, *inter alia*, that undertakers shall not be compelled to commence or to continue to give a supply of energy to any consumer unless they are reasonably satisfied in respect of the consumer's installation that all conductors and apparatus "are sufficient in size and power for the purposes for which the supply of energy is to be used and are constructed, installed and protected so as to prevent danger so far as is reasonably practicable. . . ." It is also provided that the requirements of the Regulations will be satisfied if the installation complies with the Wiring Rules of the Institution of Electrical Engineers. This suggests that the supply authorities have the power to refuse to commence a supply if they consider the consumer's installation is in any way dangerous.

Where, however, a supply is already being given the position is not quite so simple. If an examination of the consumer's installation discloses reasonable grounds for supposing that the installation or any part of it fails to fulfil the requirements of the Commissioners' Regulations, the undertakers may forthwith discontinue the supply only if they are satisfied that immediate action is necessary in the interest of the public safety, and they must give immediate notice in writing to the consumer of such discontinuance, specifying the matter complained of. In any other case if the undertakers wish to take action in the matter they have to serve a notice in writing requiring the consumer to afford facilities for inspection and testing the installation. If these are not given or the undertakers' representative after inspection, confirms either the existence of a leakage or the non-fulfilment of the requirements of the Commissioners' Regulations, the undertakers may then serve a notice on the consumer specifying the matter complained of and requiring the defect to be remedied within a reasonable period.

If the matter is not then remedied to the reasonable satisfaction of the undertakers, the supply may be discontinued after notice in writing so to do has been given to the consumer. A real difficulty arises owing to the necessity for providing for cases of disputes between the undertaker and the consumer in regard to this matter because facilities must be provided to determine the dispute and these are contained in the Regulations.

It is agreed that these are hardly the times when undertakers can be expected to engage in a series of disputes with their consumers or to go about looking for defects in installations and cutting off supplies. The most that undertakers can be expected to do nowadays is to invite their consumers to enlist the guidance and co-operation of qualified electricians in the proper equipment of air-raid shelters. It is suggested that in those cases where the undertakers either come across or have their attention drawn to faulty wiring which is a potential danger to the users they should be empowered during the war period to condemn either the whole or any part of the installation forthwith.

Insofar as the erection of a wiring installation by unqualified persons may lead to loss of life and damage to property it is a little surprising that it has not attracted the attention of the criminal law. Perhaps the sole reason for this may be found in the fact that a large number of such installations have not been found out, and that the potential dangers have mercifully not yet done their deadly work. Private air-raid shelters often accommodate ten or more persons, some of whom are no doubt in a condition of subdued excitement, and it is a serious question whether the public interest does not demand that it shall be unlawful for any person other than a qualified electrician to provide and erect an electric wiring installation in these shelters.

Ban on H.F. Apparatus

Interference with Service Radio

THE Home Secretary has made an Order forbidding any person in the United Kingdom to use or possess high-frequency apparatus having a high-frequency output of over 10 W except under permit from the Postmaster-General. Such permits may be issued only to hospitals, clinics or other institutions providing medical or surgical treatment, which are provided by a local authority or supported wholly or partly out of any public funds or by charity or voluntary subscriptions; to manufacturers who require to use high-frequency apparatus; to makers of and dealers in such apparatus; and to persons in charge of laboratories used for purposes of research or instruction.

The principal types of apparatus to which the Order applies are:—(1) Diathermy and electro-medical apparatus using valves or spark coils (frequently known as ultra-short-wave (or short or long wave) diathermy, surgical diathermy or therapy apparatus). (ii) High-frequency furnaces. (iii) Eddy current heating apparatus such as is used by valve and electric lamp manufacturers. (iv) Testing oscillators with a high-frequency output exceeding 10 W. It does not apply to the normal type of violet-ray equipment, to X-ray apparatus, infra-red and ultra-violet ray apparatus, medical shocking coils, or to wave-meters and low-powered testing oscillators as used by radio dealers.

Careful measurements have been taken of the electric field radiated by apparatus of the type covered by the Order, especially electro-medical apparatus. High-frequency apparatus emits radiations covering an extremely large band of wavelengths, and these radiations cannot be confined to any one wavelength. It has been proved that interference to wireless sets on the ground can be experienced at distances exceeding 10 miles, while interference to wireless sets in aircraft flying at 10,000 ft. can be experienced at 50 miles or more.

The danger of interference at a vital moment to the wireless communications of the Services and to the radio control of our own aircraft is so great that it has been found necessary to issue this prohibition. The operator of this type of apparatus is nearly always unaware of the interference it is causing, and it is most difficult for the Service being interfered with to locate the source of interference.

The Order applies to the whole of the United Kingdom and came into force on September 2nd, and all private individuals and private nursing homes now using electro-medical or other apparatus of the types to which the Order applies must forthwith take all steps to ensure that no further use is made of it. They must also, if they have not already done so, report their possession of the apparatus to the local police, as required by Regulation 7A of the Defence Regulations.

STREET LIGHTING IN WARTIME

The Case for the Modified System

By E. E. Hoadley, M.I.E.E.

At the present time there is a great deal more information and experience available as to what is allowable in connection with the lighting of streets in wartime than was the case in the early part of last winter. People were then, metaphorically as well as literally, "groping in the dark"; no one knew what conditions would have to be met and the authorities, of necessity playing for safety, decreed "No street lighting." Various opinions were held at that time as to the wisdom of such a decision, and when the number of traffic accidents showed a very considerable increase there was an outcry against the black-out, and much effort was expended in obtaining some amelioration of the condition of total darkness in the streets.

I held certain opinions last winter and held them very strongly, but in the light of what I know now, very frankly admit that my previous opinions were wrong. These opinions were to the effect that in towns where means existed for extinguishing the street lighting within a very short time, say, within a minute and a half, something considerably better than an illumination of the order of 0.00025 foot-candle should be allowed; if panic was to be feared as the result of switching off this better lighting on the receipt of an alarm and plunging the streets into complete darkness, then two methods of street lighting could be used as follows:—(1) A system of 0.00025 foot-candle intensity, and (2) a system very much better than this, but still not nearly up to the standard accepted for pre-war lighting. The systems could be used simultaneously, only switching out No. 2 on the receipt of an alarm, or they could be used on a change-over switch, so that if No. 2 went out, No. 1 would come on and remain alight during a raid.

Mr. Hoadley, as most of our readers know, is borough electrical engineer of Maidstone and a past-president of the I.M.E.A.

During the early part of last winter a large number of experiments and trials were made of many different forms and intensities of street lighting. The Ministry of Home Security and the Illuminating Engineering Society working together on this problem, with the Fighter Command ever in the background—and being the final arbiter as to what could be permitted on the score of safety and what could not be permitted—evolved a specification for street lighting fittings that would comply with the requirements for safety from the air.

As the darker days of last winter approached and the toll of traffic accidents still mounted, a considerable outcry arose from members of municipalities responsible for the lighting of the streets or the safety of the public. At a meeting held in London of the Association of Public Lighting Engineers very strong opinions were expressed by people from many parts of the country condemning the blacking-out of the streets, and stating that the unknown casualties of air raids were to be preferred to the known and ever-increasing casualties caused by traffic in blacked-out streets.

Views Changed by Demonstration

A short time after this meeting a demonstration length of streets, both main road and side streets, lighted by means of fittings made to a stringent specification and giving an illumination of the order of 0.00025 foot-candle was prepared and certain interested people were invited to view it. I was one of these people, and arrived on the spot on a dark winter evening with a drizzle of rain, in a highly critical frame of mind, still holding very definite opinions on the subject of wartime street lighting. The 0.00025 foot-candle lighting was switched on before the party arrived, and my first reaction to what I saw was "This is next door to useless."

Some ten minutes or so were spent in walking up and down the road, during which one got accustomed to the degree of illumination, and then the street lighting was switched off. This was the moment when the difference between some light and no light was really appreciated. It was difficult to believe that seeing conditions could have been so much worsened by the removal of an amount of light that had previously been almost scoffed at. The process of alternating short periods of "lights on" and "lights off" brought home very forcibly to those present the very great difference between no light at all and light of an intensity even so low as 0.00025 foot-candle.

This visit and inspection convinced me that where nothing better could be allowed, for one reason or another, such lighting was well worth while for its value as an aid to pedestrian movement, but as an aid to traffic safety from the vehicular point of view, I was not and am still not enthusiastic. In this connection and as a daily motorist of very many years' standing, I consider that the reduction of the 30 miles per hour speed in controlled areas to 20 miles per hour after lighting-up time will, if strictly enforced, do more to help safety on the roads than any form of street lighting of the intensity allowed could ever do.

Having settled the point that street lighting of an intensity of 0.00025 foot-candle was the maximum that could be allowed, for reasons of safety, during the period of an air raid, other questions then arise.

If the above-mentioned intensity of street lighting can be kept alight during an air raid without adding to the danger, then it is reasonable to ask whether some higher intensity of street lighting could not be allowed, provided a guarantee could be given and carried out that such lighting would not be seen by enemy aircraft. Logically, it cannot matter from the point of view of safety how much lighting a town has in use if it is absolutely certain that such lighting cannot be seen by enemy aircraft at any time and wherever they may be. Such a condition presupposes, first, that no enemy aircraft can cross the coast or some defined line undiscovered; secondly, a knowledge of the distance at which the street lighting or its resultant glow would be visible to aerial observation; and thirdly, an infallible system of communication and switching that will enable the street lighting to be switched off in less time than that in which an enemy aircraft could get from, say, the coast to the point from which the street lighting would become visible.

After spending a considerable time in exploring the position I came to the conclusion that while no improvement in street lighting could be permitted with safety in many places, there were many other places where, provided the requisite conditions as set out above were complied with, street lighting of a considerably higher intensity could be allowed.

Greater Intensity Impracticable

In this frame of mind I was one of a small deputation which visited the Ministry of Home Security and interviewed the chief officials. A long discussion ensued on the subject of street lighting in wartime, having in view the experience gained since the outbreak of the present hostilities. Much information of a highly confidential nature was placed before the deputation and their questions were answered very frankly. As I do not wish to face the prospect of imprisonment for disclosing secrets, no more will be stated in this connection, except to say that certain conclusions were very forcibly impressed on my mind.

The first reaction was the feeling that the subject of wartime street lighting had been very closely examined and studied by the Ministry both from the point of view of national safety and that of the needs of the travelling public. I was also convinced that for the reasons put forward at the interview there are very few places in Great Britain where with any form of instantaneous switching it would be safe to allow street lighting of greater intensity than that which can be permitted to remain alight during an air raid.

From the above statements, it will now be realised that the public of this country will have to live through the coming winter with the same street-lighting conditions as were allowed for part of last winter lighting season, and the question arises in many towns: "Is the installation of the special Home Office pattern of street-lighting fitting worth the expense"? From what I, a once-hostile critic, have seen in many places I unhesitatingly consider that it is worth while; the difference on a really dark night is very noticeable, and although it is not possible to identify people by 0.00025 foot-

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Pioneer Closed-feed Systems

I HAVE been asked to verify the fact that the Wood Lane generating station (now closed down) which belonged to the joint electricity undertakings of the Kensington and Knightsbridge Electric Lighting Co., Ltd., and the Notting Hill Electric Lighting Co., Ltd., carried out the pioneer work in making the closed-feed system applicable to power houses, or as they were then called "central stations." Venturing to think that the matter is of sufficient historical interest to be put before the operating engineers of to-day, I solicit the courtesy of your assistance to bring the matter before them.

During 1921 I invited Messrs. G. & J. Weir to draw up and submit to me a scheme whereby it would be possible to use their (then) new system of closed-feed and deaerating principles for power houses. They were loath to apply their ideas to central power-station practice, for the reason that they considered it a wiser commercial policy to await further operating experience in marine service before undertaking central power-station work on similar lines. Being convinced of the importance of the application of the system to power houses, the discussions were continued, and in this connection I would remark upon the practical support I received from my chief assistant engineer, Mr. L. S. Fosbrooke, now station superintendent of the Battersea power station of the London Power Co. Proposals subsequently agreed to with Messrs. Weir for the Wood Lane generating station were responsible for the first comprehensive closed-feed and deaerating plant in power-station practice.

I am afraid that in those days the pioneer engineers did not desire, or seek for, the publicity which is so freely given now, but that is no reason why credit should not be given to those who saw the possibilities of new ideas and pressed them forward for the benefit of those to come after them. I am grateful to be able to add that Messrs. Weir confirm my remarks, for owing to their own pioneer spirit and the persistence of Mr. Fosbrooke's efforts and practical suggestions, I was urged to continue to progress with that which at first I began to despair of.

C. MANCHA BENNETT, M.I.E.E.,
Late chief engineer at the Wood Lane generating station of the Kensington and Notting Hill Electric Lighting Companies.

London, S.W.1, *August 29th.*

Domestic Load

In reply to Mr. Schiller's letter in your August 30th issue the explanation of an apparent inconsistency would appear to be a misreading of the particulars which refer to two distinct classes of electric flats.

The first type comprises small four-roomed flats, occupied by average middle-class families, such as senior shop assistants and city clerks in the £300/£500 income class. Coal fires are used in the living room—and being flat dwellers, the occupants apparently use this fire right up to the time of getting into bed, and do not use the electric fires in the bedrooms. The average daily consumption was 15 to 25 kWh, which is in agreement with Mr. Schiller's quotation of 4,000 kWh a year for another estate.

The second class I have described as "luxury" flats—rents £200/£300 per annum—occupied by the £1,000 a year income class, with one servant living in. I did not state annual consumptions, but the 8,250 kWh mentioned by Mr. Schiller is more applicable to this class.

With reference to the shape of the cooking peak and the absence of the "towering" characteristic, this in my opinion is due to the use of "change-over" switches for cooking and water-heating loads and thermostatically controlled ovens.

I thank Mr. Schiller for his interest, and suggest that if the results are not "typical" as he contends, they surely indicate what has been attained, and is attainable, and should encourage domestic electrification.

G. O. MCLEAN.

Derby, *August 30th.*

Street Lighting in Wartime

(Concluded from preceding page)

candle lighting, it does definitely prevent pedestrians walking into each other, or into obstructions such as the corners of walls, lamp posts or piled up sandbags. It also renders a whitened kerb visible.

To arrive at a decision, whether or not to install this lighting, it is of no use whatever to inspect streets so lighted when there is any degree of moonlight or even a very bright starlit night; then one is comparing like with like and the question naturally arises: "Is the additional cost justified by the amount of improvement in visibility?" During the winter months, however, there are a great many very dark nights, when many people do not go out solely owing to the difficulty in getting about, and those who have to go out on foot run much greater risks of injury than would be the case if street lighting even of 0.00025 foot-candle intensity were more generally installed.

Finally, the conclusions arrived at after an exhaustive study of the subject are that no increase of the intensity of illumination for street lighting can be permitted on the grounds of safety of the public, and that the installation of street-lighting fittings in accordance with the Home Office specification is definitely well worth the comparatively small expense involved, owing to the contribution such lighting makes to the safety and convenience of those pedestrians who have to be out and about after dark.

Factory Lighting

Joint Committee Formed

IT is stated by Mr. C. W. Sully in the *I.M.E.A. Journal* for September that last February a letter was addressed to H.M. Chief Inspector of Factories at the instigation of the I.M.E.A./E.L.M.A. Joint Committee, pointing out that war conditions made it necessary for factories to work longer hours under artificial lighting. The letter proposed, in order to obtain maximum production under those conditions, that the illumination levels recommended to factory executives for specific tasks in industry should be based upon the upper part of the appropriate range of the Illuminating Engineering Society's lighting code. It also suggested that the proposals of the Fourth Report of the Departmental Committee on Lighting in Factories should be made obligatory. The reply stated that the question of taking further steps to secure improved lighting under war conditions was under active consideration. The Departmental Committee issued its Fifth Report in July, proposing that 6 ft.-candles should be compulsory as a minimum 3 ft. from the floor instead of the 1 ft.-candle previously recommended.

In June the E.L.M.A. Lighting Service Bureau received intimation that the Admiralty, Ministry of Supply and Ministry of Aircraft Production were contemplating the issue of instructions to all their key factories to install adequate artificial lighting over all working areas engaged on the execution of Government contracts. This letter of instruction has now been issued and asks firms to report either the name of the lighting firm from whom they are obtaining advice and estimates for bringing their lighting up to the required standards, or that they have submitted their requirements to a Joint Lighting Committee in order that the Committee may nominate a firm to deal with the inquiry.

To avoid delay, the intimation was coupled with a request to set up a Joint Lighting Committee to represent all firms whose experience in planning and executing industrial lighting schemes qualify them to assist in expediting the proposed measure. A meeting was arranged, under the chairmanship of Mr. J. Y. Fletcher, of the various associations interested in the electric lighting industry. That meeting requested the following Associations:—British Electrical and Allied Manufacturers' Association; the British Electrical Development Association; the Cable Makers' Association; the Electric Light Fittings Association; the Electric Lamp Manufacturers' Association; the Incorporated Association of Electric Power Companies; the Incorporated Municipal Electrical Association; and the National Electrical Contractors' Trading Association to nominate representatives to an executive committee to deal with any matters referred to it by Government Departments concerning the electric lighting industry. It also recommended the appointment of Sir Duncan Wilson as chairman of the Committee and approved a proposal made by the Ministry of Supply that the secretariat of the Committee should be placed in the hands of the E.L.M.A. Lighting Service Bureau.

The Committee held its first meeting on July 19th. At that meeting it set up, at the request of the Ministry of Supply, a sub-committee of reputable lighting firms:—(1) to establish an equitable rota for operation by the secretariat; and (2) to agree on reasonable standardisation of lighting practice in order to ensure urgent attention being given to the requirements of all key factories.

Both Committees are now operating on behalf of the Service Departments and inquiries addressed to the secretariat are being passed on to a competent firm who at once arranges for an illuminating engineer to visit the factory and deal with the inquiry at the request of the Joint Lighting Committee.

More recently the Ministry of Labour has indicated its desire to make use of the Committee if and when the recommendations of the Departmental Committee on Factory Lighting are adopted by the Government.

Meter Assistance

THE *I.M.E.A. Journal*, referring to the shortage of electricity meters, suggests that those undertakings possessing surplus motors which are capable of being used may be prepared to transfer them to other undertakings which need them for use during the war. It is stated that the British Electrical Development Association has prepared a schedule of all "surplus" appliances, and although meters are not specifically mentioned, members of the I.M.E.A. are asked to notify E.D.A. if they have any meters surplus to requirements, giving full particulars.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE staffs of the Yorkshire Electric Power Co. and Electricity House, Ltd., congratulate **Sergeant Observer D. Windle,** who has been awarded the D.F.M. for flying operations near Berlin. Sergt. Windle, who is twenty, is the first Leeds airman to gain this decoration, and he has received special congratulations from the Air Officer Commanding-in-Chief of the Bomber Command. He was for three years in the Y.E.P. cash department, but flying always appealed to him, and in April, 1938, he joined the R.A.F. to be trained as a navigator. Already he has made many flights over enemy territory.

Able-Seaman Arthur Wright, one of the North Lincolnshire and Howdenshire Electricity Co.'s linesmen at Brigg has been awarded the D.S.M. for gallantry in operations off Norway. Upon his return home he was met by Mr. Taylor, chairman of the Brigg U.D.C., Councillor C. C. M. Clarke, and Mr. Lawson, the company's district engineer. A party was held in his honour in the evening, at which presentations were made to him.

Major Stanley M. Mohr, O.B.E., M.C., M.I.E.E., managing director of the Micanite & Insulators Co., Ltd., has been re-elected chairman of the British Plastics Federation for the 1940-1 session.

Mr. N. Burke, who has been sales manager of James Howden & Co. (Land), Ltd., is to join the Ministry of Supply as from the end of this month until the conclusion of the war. So far as his engagements with the Ministry will permit, he will remain in touch with the company.

Major J. Entwistle, R.E., A.M.I.E.E., has had to relinquish his commission in H.M. Forces due to ill-health. He has recently joined Mersey Cable Works, Ltd., and is now at this company's works, Linacre Lane, Bootle, Liverpool, 20.

Mr. A. Jolley, at present mains foreman with the Milford Haven Urban Dis-Council, has been appointed mains foreman with the Milford Haven Urban District Council. He commences his duties on September 16th.

In view of his many other interests, **Mr. G. R. T. Taylor** has resigned his seat on the boards of Vickers, Ltd., and the English Steel Corporation, Ltd. He retains his directorship of Taylor Bros. & Co., Ltd., a subsidiary of the English Steel Corporation.

Mr. Price F. White, borough electrical engineer at Bangor, is retiring from that position on September 7th.

Mr. H. A. Brinelow, superintendent with the Northmet Power Co., has been appointed to the power station staff at Northmet House, Cannon Hill, N.14, the company's headquarters. He has been succeeded by Mr. L. W. Stretton.

Obituary

Mr. G. Laird.—We regret to learn from the *A.E.I. News* of the death of Mr. George Laird, a director of the Metropolitan-Vickers Electrical Export Co., which occurred on August 9th at the age of sixty-six. Mr. Laird commenced his business activities with the Westinghouse Electric & Manufacturing Co., Pittsburgh, about 1898, in preparation for taking a position with the British Westinghouse Electric & Manufacturing Co., Ltd., on its formation in 1900. On going to Trafford Park in 1902 he joined the electrical engineering department under Mr. McLaren, and was engaged principally on traction work. He joined the Glasgow office staff in 1904, and spent some years in Scotland, afterwards joining the export staff of the London office for a period. In 1909 he went to India, where he was associated with Jessop & Co., who were at that time agents of the British Westinghouse Co. In 1913 Jessops ceased to be the agents, and Mr. Laird established an office for the company in Calcutta, being appointed manager for India; and subsequently further branches were opened as the Indian business developed. While he was in charge of the Indian business the Tata Mills, Birkmyre Mills and other important contracts were carried out. On returning from India he joined the board of the Metropolitan-Vickers Electrical Export Co.

Sir Oliver Lodge.—A memorial service for the late Sir Oliver Lodge was held at St. Margaret's, Westminster, on Tuesday last. The Institution of Electrical Engineers was represented by the president, Mr. Johnstone Wright, and the secretary, Mr. W. K. Brasher. Others present were Miss Caroline Haslett, Dr. Alexander Russell, Sir Noel Ashbridge and Messrs. H. T. Young, F. Gill, D. S. McColl, Rollo Appleyard and W. C. P. Tapper.

Dr. H. Stroud.—The death occurred on Tuesday of Dr. Henry Stroud, Emeritus Professor of Physics in the University of Durham. He was born in 1861 and was educated at Bristol and Cambridge; he took M.A. degrees at London and Durham and was a D.Sc. of both Cambridge and Durham. He was Dean of the Faculty of Science at Armstrong College, Newcastle-on-Tyne, from 1919 to 1921 and was later vice-principal of the college. He had been a member of the Institution of Electrical Engineers since 1900 and he was a fellow of the Institute of Physics.

Mr. H. B. Clarke. — The death has occurred at Alloa of Mr. Henry Braithwaite Clarke, who commenced his engineering career with the Lowea Engineering Works at Whitehaven, followed by a period with Armstrong Whitworth & Co. at Newcastle. He joined the staff of the British Electric Plant Co., Ltd., in 1902, and in point of service was the senior employee of the company. During the whole of his thirty-eight years at the Alloa Works he was associated with the drawing office and intimately concerned with many of the outstanding electrical and hydraulic schemes of the old B.E.P. Co. and its successor, the Harland Engineering Co.

Mr. A. A. Fairley.—The death occurred at Electric House, Mill Street, Ayr, on August 26th, of Mr. Alexander A. Fairley, district superintendent in Ayr and South Ayrshire, of the Ayrshire Electricity Board. Mr. Fairley was at one time mains engineer in the service of the Ayr Corporation, and he became district superintendent in Ayr on the formation of the Ayrshire Board.

Will.—Mr. A. P. Rutherford, of Edinburgh, managing director of Holders, Ltd., electrical engineers, left £4,568.

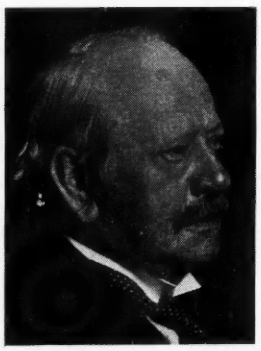
Sir J. J. Thomson

TO Sir Joseph John Thomson, who died last Friday at the age of 83, belongs the chief credit for the discovery of the electron. In addition he was directly responsible for many of the developments in physics that followed this discovery.

His original intention was to become an engineer and he studied to that end at Owen's College, Manchester, his native city. His bent, however, was towards physics and mathematics, and after eight brilliant years at Cambridge University, as undergraduate and lecturer, he succeeded Lord Rayleigh in 1884 as Cavendish Professor of Experimental Physics, which position he held until 1918, when he was appointed Master of Trinity, Cambridge, and Professor of Physics in the University.

It was at the Cavendish Laboratory that Thomson initiated investigations that led to his truly revolutionary discovery. His experiments showed that the cathode rays emanating from the negative pole in the glass bulb used in high-voltage discharges were due to the projection of electrified particles. Further researches enabled him to measure the speeds of the particles and also to establish the relationship between the mass of each and its electric charge. He proved that the mass of a particle, which was only a small fraction of that of a hydrogen atom, was the same as that of any other, irrespective of its chemical origin. This led him to postulate, in April, 1897, the existence of a fundamental unit of pure electricity (subsequently termed an "electron") that was common to all chemical atoms, thus opening up a new approach to problems connected with the structure of matter.

As an aftermath of these investigations came the hypothesis discussed in the memorable Kelvin Lecture which Sir



Sir Joseph Thomson

Joseph delivered at the Institution of Electrical Engineers in 1926, on the mechanics of the electric field. In this he combined the wave-motion and corpuscular theories. By showing that electric force was possibly intermittent in its action, taking the pressure of gas as an analogy, he reconciled phenomena explicable only by the quantum theory with those falling within the scope of ordinary dynamics. Light, in particular, and X-rays he showed to be in conformity in some respects with the theory of propagation by wave motion and in others with the corpuscular theory. On this assumption the electron must possess a structure, which he visualised as an atmosphere of particles surrounding the electron, having a definite period of vibration and capable of emitting a radiation.

During the last war, he became President of the Royal Society and played an important part in organising scientific effort on behalf of the Government. He was also closely associated with the initiation of the Department of Scientific and Industrial Research.

Sir Joseph was knighted in 1908. Other honours included the O.M., F.R.S., the award of honorary degrees and fellowships by leading British and foreign universities, the Nobel Prize for Physics and medals from scientific institutions. The latter included the Faraday Medal of the Institution of Electrical Engineers, of which he was an honorary member, the Kelvin Gold Medal and the Copley, Royal and Hughes Medals of the Royal Society. Sir Joseph was the author of numerous works and publications on physics and of an auto-biographical work entitled "Recollections and Reflections." In the revision of his classic "Conduction of Electricity through Gases" (originally published in 1903) he received the assistance of his distinguished son, Professor George Paget Thomson, F.R.S., who has for the past ten years been Professor of Physics at the Imperial College of Science.

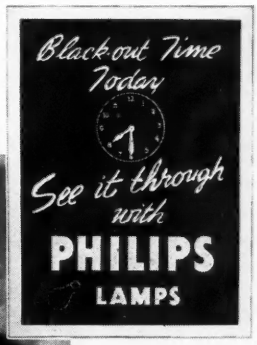
LAMP MAKERS' PUBLICITY

Schemes for the Coming Season

IN our last issue we gave particulars of the electric lamp publicity material which some manufacturers are issuing to dealers for the coming season. We now give below details of schemes which other lamp manufacturers have prepared to assist dealers during the coming season.

General Electric Co., Ltd.

As in previous years, a comprehensive programme has been embarked upon for the marketing of "Osram" lamps for the coming season. When the G.E.C. realised immediately after the outbreak of war that dealers would need more help than they were accustomed to receiving in normal times, it devised a scheme whereby personal contact could be maintained with them in all parts of the country. It embraced not only distribution of various sales aids produced from time to time, but an extension of the window-dressing service, and during the first complete lighting season of the war the G.E.C. dressed nearly twice as many dealers' windows with "Osram" lamp displays as it had done during the previous season. It is the aim of the company to consolidate and expand this scheme, despite the fact that the difficulties to be overcome are very much greater than they were last season.



An "Osram" window display unit (left) and the Philips "clock" showcard

In the early spring, when it was realised that the growing shortage of raw materials might lead to a serious limitation on the supply of sales aids, steps were taken to endeavour to ensure that the demands of dealers for showcards, cut-outs and other publicity sales aids in the coming season should be met as far as possible. These sales aids will be available for issue very shortly. Thousands of windows throughout the country will be dressed within the next few months. Included will be "Osram" lamp displays produced in such a way as to economise in certain raw materials, the centre of the displays being made up of a linen screen. The theme of the displays is briefly that although the black-out regulations have to be scrupulously observed, there is no need to be niggardly in light, either in places where people work or in their homes.

Additional to the central display unit there will be available a showcard, two cut-outs, one of which is designed around the familiar "Osram" lamp carton, a window bill and an "Open" sign for use in windows during black-out hours. All this material will be delivered personally by the G.E.C. window-dressing service. A national Press advertising scheme will be launched a little later in the year.

A Cryselco showcard

Philips Lamps, Ltd.

Although Government restrictions on printing material have placed certain limitations on lamp publicity, Philips Lamps are going ahead with plans which will keep public attention focused on the importance of good lighting in wartime. The company's new poster makes a patriotic appeal and will be available in a useful size (20 in.×30 in.) for posting on or in the window or inside the stores. The Union Jack superimposed over a yellow background makes an attractive and colourful poster. A cartoon streamer, which makes use of humour in a topical way, will have many uses. For counter or window display there is a showcard which incorporates a clock design with movable hands which can be adjusted daily to announce black-out time. Window displays are being continued on similar lines to those adopted for last season's campaign which, supported by merchandiser units, pelmets and counter displays, will enable the dealer to maintain a varied lighting campaign during the season.

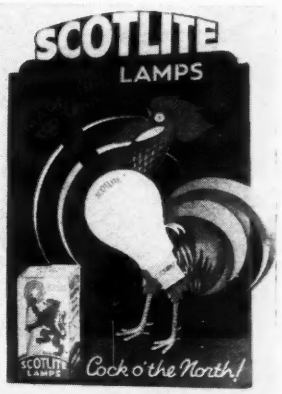
The outstanding feature of the company's publicity scheme is the puppet Technicolour cartoon "Aladdin and His Magic Lamp," which it is now releasing for showing in local cinemas. This film will also be available to any dealer who is able to arrange a local show sponsored by himself, and for a small charge the company makes a trailer to the film, including the dealer's name and business. Catalogues, leaflets and advertising novelties are also available, although in limited quantities.

Cryselco, Ltd.

A varied assortment of lamp publicity material is being issued by Cryselco, Ltd. An attractive frontispiece in colour, having the theme "Home Lighting," is a feature of the general price lists, which contain details of a full range of normal standard Cryselco lamps for domestic purposes. The cycle lamp lists are of attractive design in colour and contain a full range of lamps for either dynamo or battery lighting sets. A general showcard incorporates the same design as for the general leaflets, and on the reverse side there is an easy-reference price schedule for use by the trade. A cycle lamp showcard has a similar design to the cover of the cycle lamp leaflet, and also includes an easy reference schedule of prices. Small cut-out displays are available, primarily for counter use with a strut at the back. The design consists of a Cryselco lamp carton in full colours and in the foreground a hand holds a reproduction of a Cryselco pearl "coiled-coil" lamp.

Aurora Lamps, Ltd.

Three types of cut-out showcards suitable for counter and window display have been prepared by Aurora Lamps, Ltd., advertising their "Aurora" and "Scotlite" lamps. The first of these is the emblem in outline of a Scotch thistle which on opening up makes a platform on which is mounted an "Aurora" lamp, to the background of which is mounted in cut-out the word "Aurora" surrounded by an Aurora Borealis effect. Surrounding the whole showcard is advertising matter for the sale of coiled-coil type of lamps. Two replicas of "Aurora" cartons complete the extended showcard, which measures approximately 2 ft.×1 ft. 4 in. The second showcard shows an "Aurora" lamp surrounded by aurora colour.



The "Cock o' the North" display unit of Aurora Lamps, Ltd.

The company's trade mark of a lion rampant with an electric lamp upheld in its paw is also displayed with the words "Made in Scotland." This card measures approximately 14 in.×12 in. For the "Scotlite" type B lamps the design of last year of a cockerel in full crow with its body represented by an electric lamp in cut-out form with the words "Cock o' the North" is again available; this measures approximately 16 in.×13 in.

E.D.A. and National Publicity

IN our last issue we referred to the Ministry of Information window displays which E.D.A. is circulating. The Association has now sent us a picture of the exterior of the Brighton Corporation Electricity Department showrooms where the precautions taken against damage to the windows had decreased visibility to such an extent that Mr. W. N. C. Clinch, the borough electrical engineer, decided to give the M.O.I. displays prominence by external mounting. This scheme is arousing a good deal of local interest and the Association suggests that other electricity undertakings who are treating their windows in such a way as to reduce visibility might adopt this idea of "bringing the goods into the street."

In referring to E.D.A.'s work in connection with these displays we mentioned that the Association had sent out 462. We now learn that this figure represents the number circulated on each occasion—the total circulated to date is 1,500.

COMMERCIAL and INDUSTRIAL NEWS

Accumulator Export Group. Scottish Electricians' Wages. Hospitals and Controlled Goods

Accumulator Export Group

THE Accumulator Manufacturers' Export Group, which was formed in May to facilitate and expand the accumulator export trade, is working in close association with the Board of Trade and B.E.A.M.A., and particular attention is being paid to securing export business in those neutral countries which before the war were strongholds of the enemy, or of countries now occupied by the enemy. Apart from the expansion of the export market, certain matters relating to the provision and distribution of raw materials, labour and the like come within the scope of the Group, as also do such subjects as the provision of freight and foreign currency. Mr. D. P. Dunne is chairman of the Group and Mr. E. Powell is secretary; the offices are at 27, Bedford Row, London, W.C.1 (Tel.: Chancery 7221).

Engineers' Wages

Applications were submitted to the Employers' National Federation on August 29th by the engineering trade unions for increased wages. The president of the Amalgamated Engineering Union, Mr. J. Tanner, stated the case of his union and the National Union of Foundry Workers for an additional 3d. per hour, and the Confederation of Shipbuilding and Engineering Trades presented its claim for a flat rate increase of 10s. a week. Both conferences were adjourned to allow the employers to consider the facts and arguments brought forward.

The Labour Correspondent of *The Times* states that the second award of the National Arbitration Tribunal follows the first in stating the claim and announcing the Tribunal's decision without explanation. The National Society of Brass and Metal Mechanics reported to the Minister of Labour and National Service the existence of a dispute with the Brassfounders' Employers' Association on a claim that the bonus additions to the wages rates of its members employed in the Midlands general brassfoundry industry should, under the grading scheme, be increased by 7s. a week for men and 3s. 6d. for youths. As required by the recent Conditions of Employment Order, the Minister referred the case to the Tribunal. The award makes the increases 4s. and 2s. respectively, and takes effect at once.

Scottish Electricians' Wages

An advance of ½d. an hour is to be given to 4,500 electrical employees in Scotland as from September 1st under the cost-of-living scale agreement negotiated by the E.T.U. The new rate will be 1s. 9½d. an hour. The increase will apply to employees in the electrical contracting industry, electricians engaged on maintenance in factories and workshops and a large number of men employed by local authorities. Wages will be reconsidered in November and any variation operated from December 1st after which the agreement will be reviewed.

Limitation of Supplies Ruling

The Director of the Electrical Wholesalers' Federation informs us that the Board of Trade has decided that the following goods shall not be regarded as controlled under the Limitation of Supplies (Miscellaneous) Order:—Electric pokers; elements and replacement parts for such apparatus as kettles, cookers, irons, washers, vacuum cleaners, &c.; and stands for irons.

American Air-conditioning Load

A recent survey by the Edison Electric Institute showed that air-conditioning equipment installed in the United States at the end of 1939 was driven by motors totalling 1,045,000 kW. The survey found that there were 15,000,000 air-conditioning units in homes, representing 20,000 kW; 46,000 commercial installations (900,000 kW), and 5,000 industrial units (125,000 kW). The largest portion of the industrial air-conditioning load is represented by theatres and moving picture houses. The air-conditioning load continues to grow, although the expansion recently has not been so rapid as in past years. Of the total connected air-conditioning load, it is estimated that 745,000 kW was installed before 1938 and about 150,000 kW in 1938 and 1939.

The demand for electricity in warm weather is also increased by food-preserving appliances. It is estimated that there are over 15,000,000 electric refrigerators in service with a connected load of more than 3,000,000 kW. These two outlets have helped to even out the electric power production curve. Not many years ago the summer months recorded a substantial drop in electricity output, but with the gradual expansion in the use of air-conditioning and electric refrigeration this has disappeared.

Winding-up Petition Dismissed

In the Companies' Court on August 26th Mr. Justice Bennett, by consent, dismissed a petition for the compulsory winding up of Fred Marshall and Co. (Electricians), Ltd., and made no order as to costs. It was stated that the petitioners' debt had been satisfied by the Company.

Swedish Export Policy

The August *Anglo-Swedish Review* reports a recent statement by the Swedish Foreign Minister regarding the steps which Sweden was taking to meet the loss of a great deal of her export trade on account of the war. He referred to the trade agreements arrived at with Germany, Norway and Denmark, and said that negotiations were proceeding with Finland, Russia, Hungary and Italy. In the same issue our contemporary refers to the establishment of a Swedish Foreign Trade Compensation Company whose function will be to encourage and organise trade in markets where "compensation" or barter arrangements have to be made to overcome sale and payment difficulties. Among the bodies which will be represented on the board of the new company are the Export Association, the Electrical Industries Association, and the Engineering Industries Association.

Merchant Navy Window Display

In our issue of August 16th we referred to the movement to use shop windows as a medium for national publicity, and illustrated the R.A.F. display installed in one of the windows of the General Electric Co., Ltd., at Magnet House, Kingsway, London, W.C.2. We now reproduce a photograph of the Merchant Navy display which the company has recently installed in one of its display windows.

The Merchant Navy display in one of the G.E.C. windows at Magnet House, Kingsway, W.C.2

South African Import Concessions

The *Board of Trade Journal* reports that the South African Government has decided to permit the importation free of duty of certain materials for the motor-bus and electric trolley-bus body-building industry. The new proclamation relates to chassis and framework, metal sections, driving and trolley equipment and finishing materials.

A further revised regulation permits electrical parts, not including heating plates and elements, and heat indicators, for use in the manufacture of electric stoves and hotplates to be imported under Tariff Item 143 (c). The "minimum" duty under this item is nil, and applies to goods of United Kingdom and Canadian origin. The intermediate and maximum duties are 5 per cent.

E.A.W. Certificates

The eleventh E.A.W. certificate examination for domestic science and science teachers was held on June 29th. Of the 102 candidates who sat for the examination, 87 were successful in obtaining their certificate, five of them with distinction. The total number of holders of this certificate is 673.

On June 20th the thirteenth E.A.W. certificate examination in electrical housecraft for demonstrators and saleswomen was held when fifty-three candidates qualified for the certificate, five of them with distinction. The total number of holders of this certificate is now 788.

Increased American Exports

The United States Department of Commerce announces that the total value of electrical exports during the first half of this year was $71,207,425, representing an increase of 35.2 per cent. over the figure for the corresponding period of 1939. The June total was $12,984,343, an advance of 7.4 per cent. upon the May figure, due mainly to larger shipments of rubber-covered wire. Switchboard panels were another item which showed a substantial rise.

Industrial Opportunities in Cheshire

The area of supply of the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board abounds in sites for industrial development, and with a view to bringing before manufacturers, particularly those engaged on war industries, the advantages of the area, the Board has prepared a brochure in which the amenities and facilities offered are set forth. Information relating to rates, water, gas, sewage and transport is included, while there is a good deal of useful data relating to the Board's undertaking.

Ismay Lamps

John Ismay & Sons, Ltd., inform us that an error occurred in their advertisement in our last issue when it was stated that Ismay lamps from 15 to 150 W were sold at a shilling. Actually this applies to the 15-60-W range only. The 75 and 100-W lamps cost 1s. 6d. and the 150-W size 2s. 6d. The company also state that their policy is to relinquish the use of the name "Relma" and to refer to their products as "Ismay" lamps.

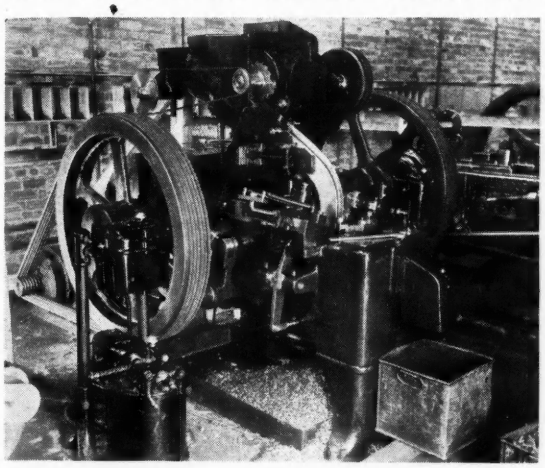
Controlled Goods for Hospitals

The Board of Trade has issued an open general licence under the Limitation of Supplies (Miscellaneous) Order permitting the supply of certain controlled goods without restriction to hospitals and similar institutions. The goods

covered include laundering machines, vacuum cleaners, refrigerators and electrical appliances in paragraph 17 of the Order, i.e., toasters, irons, plate warmers and kettles. The hospitals affected by the Order are those belonging to local authorities, such voluntary hospitals as are included in the Emergency Hospital Scheme of the Ministry of Health and auxiliary hospitals and convalescent homes established by the War Organisation of the British Red Cross Society and the Order of St. John of Jerusalem on behalf either of the War Office or of the Ministry of Health.

Blacking Out Factories

With the approach of longer hours of darkness, the question of factory blackout becomes increasingly urgent. Factory managers who are again faced with the question of obscuration of lighting are therefore reminded that a pamphlet called "Wartime Lighting Restrictions for Industrial and Commercial Premises," can be obtained from the Stationery Office or through any bookseller, which gives complete information on the subject. The price of the pamphlet is 2d. (3d. by post). This pamphlet, issued shortly before the war, is still completely up to date.



Machines for bolt manufacture at the works of E. Lindley & Co., Ltd.

Spectroscope Analysis

Wild-Barfield Electric Furnaces, Ltd., have been appointed by Adam Hilger, Ltd., manufacturers of the "Spekker Steeloscope," to be distributors of this instrument in the United Kingdom. It is claimed that the instrument brings spectroscopic analysis within the reach of most engineering firms. In its simplest form it can be used for the immediate check and sorting of incoming steels from suppliers, or for identification of steels in stores which, even in the most carefully organised systems, sometimes get mixed. With the "Insta" eyepiece, at slightly extra cost, it is a valuable addition to any metallurgical laboratory for accurate visual quantitative analysis.

Purchase Tax Registration

The Finance Bill, which has just become law, empowers the Commissioners of Customs and Excise to prescribe the final date by which persons who are required by law to register for Purchase Tax purposes must do so. The Commissioners have made an Order requiring all persons now carrying on a registrable business to apply for registration before September 20th. Manufacturers of Purchase Tax goods and wholesale dealers in such goods who have not yet received a copy of the Customs explanatory leaflet and the necessary form of application for registration should obtain one, without delay, from their local Officer of Customs and Excise or from the Custom House, London, E.C.3. The Order referred to above is Statutory Rules and Orders, 1940, No. 1552, copies of which may be obtained from H.M. Stationery Office, or through any bookseller. (Price 1d.)

Conduit Specification

There has just been issued a revision of B.S. 31-1933 for steel conduits and fittings for electrical wiring, which was undertaken principally with the view to clarifying the position of the lugs relative to the spout outlets in small circular boxes and the table giving the dimensions of the entry bushes has also been slightly amended. Copies may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 3d. post free.

Canadian Radio Apparatus Production

According to a report issued by the Dominion Statistician, a new record in the output of radio receiving sets in Canada was set up last year with a total of 348,507, as compared with 291,721 units in 1938. The value of the 1939 production is given as £1,735,600, as against £1,760,400 in the preceding twelve months. Of the receiving sets sold in Canada during last year about 66 per cent. were of the all-electric type and 34 per cent. battery operated.

Electric Drive in Screw Manufacture

The accompanying illustration shows machines driven by Brook motors which have been installed at the works of E. Lindley & Co., Ltd. These machines produce bolts from wire at the rate of 90 per minute, and this method of manufacture is so economical that 19½ per cent. of finished set-screws are obtained from one ton of wire. A "V"-belt drive has been attached direct on to the rim of the flywheel of the machines, and inertia is so great that slip-ring motors are necessary. The rated HP is 7½. Control is from Ellison switchgear.

Cheerful Rationing

"There is no depression in this house . . ." is the keynote of the gaily coloured "Cheerful Rationing" cards issued monthly by the E.A.W. giving practical information on domestic management and recipes enabling housewives to be cheerful and efficient under wartime housekeeping conditions. The latest card issued gives hints for the black-out and points out that during the long evenings depression can be avoided if housewives do not "try to manage" with irritating temporary black-out arrangements. Among useful suggestions given is one for installing a plug point wherever apparatus is used, otherwise in an emergency someone may trip over the flexible. A generous number of 60- and 100-W lamps should be available and special attention should be paid to lighting arrangements at the top of the house. With a complete black-out on the outside and good lighting inside regulations are complied with and strain is avoided. Some useful cookery hints are included.

Electrical Manufacture in Russia

The construction of three big factories for the manufacture of electrical equipment will be started this year by the Commissariat of the Electrical Industry of the U.S.S.R. One, to produce AC electric motors as well as motors for the textile industry, will be built in Siberia. A factory to be erected in Lysva, Molotov Province, will produce turbo-generators ranging in capacity from 1,000 to 12,000 kW, and asynchronous motors and hydro-electric generators of medium size. The third, to manufacture transformers, will be built in Sverdlovsk, in the Urals.

An Unusual Accident

The July *Bulletin* of the National Safety First Association reports an unusual mishap to an electrician. The man was repairing the cables on a distribution box when he found that one of the cables was covered with a green deposit which he took to be verdigris. The deposit extended from the entry of the cable into a terminal lug for about an inch. He proceeded to scrape the cable when an explosion occurred which temporarily blinded him, and a piece of material entered one of his eyes. Subsequent investigation showed that what the man thought was verdigris was copper acetylide (a detonating composition) produced by chemical action between the copper and acetylene fumes given off by a near-by pickle liquor well.

Trade Announcements

Dormor & Co., Ltd., wholesale electrical, radio and lamp distributors, have removed to 38a, Commercial Road, The Square, Bournemouth. The telephone number remains unchanged.

Siemens-Schuckert (Great Britain), Ltd., has come to an agreement with Mr. Victor Stobie, M.I.E.E., of Dunston House, Harrogate, to manufacture high-frequency furnaces to his patents under an exclusive licence.

E. C. Acheson, Ltd., have moved from Thames House, Millbank, London, S.W.1, to temporary premises at 9, Gayfere Street, Westminster, London, S.W.1. Telephone Nos.: Abbey 3366/7/8.

Manchester College of Technology

The prospectus of University Courses in the College of Technology, Manchester, for the session 1940-41 is now available. The session will open on September 26th, and enrolment will take place on September 23rd, 24th and 25th.

Change of Name

Multiple Fuses, Ltd., has changed its name to Multiple Fuses and Accessories, Ltd.

Purchase Tax Table

A Purchase Tax Table, which should prove of value to traders, has been published by Edwards & Smith (London), Ltd., 1, Drapers' Gardens, London, E.C.2 (1s. 3d. post free), which shows the tax on amounts to £1,000 at full and half rates (6s. 8d. and 3s. 4d. in the £).

Prices of Materials

Henry Gardner & Co., Ltd., report, September 4th: English block tin, £255 15s., £2 10s. decrease.

Edward Till & Co. report, September 4th: India rubber, Para fine, 1s. 1d., ½d. decrease.

New Catalogues and Lists

British Aluminium Co., Ltd., Raven Hotel, Castle Street, Shrewsbury.—A booklet of 18 pages on the use of aluminium-silicon alloys, in which the results of practical and laboratory investigations into modification technique are set out.

Ensign Lamps, Ltd., Kent Street Works, Preston.—A broadsheet illustrating the lamp publicity material which the company is issuing to dealers.

Manganese Bronze & Brass Co., Ltd., Handford Works, Ipswich.—A new revised edition of the "Oilite" size list, containing detailed dimensions in inches and millimetres of all available sizes and lengths of "Oilite" self-lubricating bronze bearings. Many new sizes are included. There is also useful fitting and machining data.

V. G. Manufacturing Co., Ltd., Gorst Road, Park Royal, London, N.W.10.—A catalogue giving particulars of V. G. high-quality porcelain accessories for the electrical, gas, chemical and allied industries.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, Kingsway, W.C.2.—Posters and printed details of the "Legalite" mercury torch switch and the "Supreme Miracle" immersion heater for hot-water bottles. These posters are also obtainable as window and counter display cards with back easel.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Sterling Utilities, Ltd., (London), (present address).

30A S P 1 C range switches with top bottom and back entrance for ¾ in. conduit.

FUDGE resistances.

ELECTRICITY SUPPLY

Kirkcudbrightshire Rural Scheme. Sheffield's 24,600 "Starlight" Lamps. Development in Singapore

Bournemouth. — LIGHTING BAN TO REMAIN.—The Lighting Committee has received a letter from the Ministry of Home Security to the effect that the Air Ministry cannot advise that street lighting should be permitted at Bournemouth and that it is not possible to foresee a period when sanction might be granted.

Bradford.—LOSS ON UNDERTAKING.—There was a loss of £31,769 on the past year's working of the Electricity Department, due, it is stated, to lighting restrictions, A.R.P. work, higher wages, and increased cost of materials.

Cheshire. — EXTENSIONS APPROVED.—The County Council has given consent to the North Wales Power Co. for an underground cable diversion; to the Chester Corporation for the extension of underground and overhead lines; and to the Macclesfield Corporation to erect overhead lines. The Council has also agreed to the erection of overhead extensions by the Mersey Power Co. and by the Electricity Distribution of North Wales and District, Ltd. The Mid-Cheshire Electricity Supply Co. is granted permission to lay underground mains and services and construct overhead extensions to farms.

Enfield.—LIGHTING WARDENS' POSTS.—The A.R.P. officer recently reported to the Emergency Committee that for economy in running costs 25-W lamps had been installed in wardens' posts, but as insufficient light was provided 40-W lamps were now to be installed.

Guildford.—HIGHER CHARGES.—Certain increases are proposed in the charges for electricity, which are at present very low. In the case of the all-in tariff no addition to the standing charge is contemplated, but it is recommended that the running charge for the first 1,000 kWh per quarter shall be raised from ½d. to ¾d., and that thereafter the charge shall be 2/5d. In the rural area it is proposed to increase the running charge from ½d. to ¾d. up to 1,000 kWh, the subsequent rate being ⅝d. The revision also includes an increase in the town area lighting flat rate from 4d. to 4½d. up to 500 kWh, and from 2½d. to 2⅞d. for additional consumption.

Kettering.—UNDERTAKING'S ACCOUNTS.—The Electricity Department's gross profit for the year ended March 31st last (£54,815) showed a reduction of £5,787 compared with the previous year and there was a net loss of £4,042 against a net profit of £1,682 in 1938-39. The loss is mainly attributed to increased cost of electricity purchased and generated, A.R.P. expenditure and war service allowances, reduction in grant on unemployment schemes, increased assessments for rates, and reduction in income from public lighting, &c., due to war conditions. Electricity sales during the year amounted to 98½ million kWh, with an increase of 2½ million kWh in supplies to ordinary consumers and 12¼ million kWh in electricity sales under contract, making a total advance of 15 per cent. The number of consumers at March 31st was 22,669, an increase of 668 during the year. The loss of £4,042, together with £427 capital expenditure out of revenue, has been charged against the reserve fund, the balance of which is £60,279. The capital outlay at March 31st was £905,462, and the discharged capital outlay £411,875, leaving a sum of £493,587 still to be provided.

STREET LIGHTING.—Kettering's system of modified street lighting is to be extended; 400 additional fittings have been purchased, of which 160 will be used for the completion of main street lighting, and the remainder for the corners of side streets. The lamps are to be ready for use by the autumn.

Kirkcudbrightshire.—TARIFF INCREASE.—At the last meeting of the County Council the proposal of the Electricity Committee to increase all tariffs by 12½ per cent. was agreed to.

POSITION OF RURAL SCHEME.—The convener of the Committee, in a progress report, stated that until they had more consumers with a larger consumption than at present the position of the scheme would not be sound. During the past year approximately 6,268,310 kWh was purchased at an average price of 0.325d. per kWh. Of this total 5,358,699 kWh was sold at an average price of 1.60d. per kWh. Transmission losses amounted to 14.50 per cent. The final result was a deficit on the year's working of £2,695 and to meet this a similar sum has been transferred from the reserve account, which now stands at £5,129. Total capital expenditure to date is £260,581.

London.—WANDSWORTH.—The Borough Council has decided to adopt modified street lighting for the coming winter. The Lighting Sub-committee has obtained a great deal of information as a result of trial installations, and the capital cost is estimated at £9,473.

Manchester.—LOANS.—The Electricity Committee has obtained sanction to borrow £9,000 for plant and £10,000 for mains.

POWER STATION EXTENSION.—The Central Electricity Board has authorised the Committee to proceed with a power station extension involving the installation of a 30,000-kW turbo-alternator set and three boiler units, together with the necessary building and ancillary works.

Perth. — MODIFIED LIGHTING. — After carrying out experiments the Watching and Lighting Committee has decided to extend the low-intensity lighting at street junctions.

Plymouth. — LOAN SANCTIONED. — The Electricity and Street Lighting Committee of the City Council has reported that the Electricity Commissioners have approved the borrowing of £275,000, part of the £308,330 applied for.

Prescot.—STREET LIGHTING.—The Urban District Council has decided, as an outcome of discussions with representatives of the Liverpool Corporation Electricity Department, to proceed with a scheme of modified street lighting.

Sheffield. — MODIFICATION OF STREET LAMPS.—The Watch Committee reports that 24,615 street lamps, lighting approximately 660 miles of roadway, are now equipped with special wartime fittings.

MAINS EXTENSIONS. — The Electricity Committee is to extend the mains at a cost of £7,796.

NEW METER DEPARTMENT. — Arrangements have been made for the Works Department to provide a new meter department for the Electricity Committee at the Sheaf Street premises at an estimated cost of £2,165.

Overseas

Singapore.—ELECTRICAL PROGRESS.—Mr. C. C. Payne, the municipal electrical engineer, reports that in 1939 the Electricity Department experienced a successful and progressive year, as is evidenced by the record increase in the quantity of electricity sold and the higher revenue, despite a reduction in charges. With the continued expansion of the Department's activities he suggests that consideration will have to be given to the installation of further generating plant.

Altogether, sales last year amounted to 51.0 million kWh, an increase of 5.5 million kWh, or 12 per cent., while the maximum demand on the power station rose from 14,800 kW to 16,300 kW. More than half of the total consumption (28.0 million kWh) was required for power purposes, and there was an increase in such supplies over the previous year of 3.1 million kWh. The largest proportionate advance, however, was in domestic consumption, which increased by 27 per cent., while 2,353 additional heaters and domestic appliances were connected during the year, making the total number 9,671. At the end of December there were altogether 28,255 consumers, against 26,057 a year before.

The average price obtained per kWh sold fell from 6.531 to 6.074 cents, and the cost was reduced from 5.260 to 4.847 cents. Revenue increased from $3,089,554 in 1938 to $3,230,104 last year, although there was a reduction in the lighting rate from 14 to 13 cents. It appears that greater concessions could be made to consumers were the profits not largely raided for the rates. Not only is the net revenue account charged with $200,000 as a payment to the general rate fund, but there is a further rate contribution of $100,000 on appropriation account.

TRANSPORT

Bournemouth.—HIRING OUT TROLLEY-BUSES.—It is proposed to hire twelve trolley-buses to Wolverhampton Corporation and a further eighteen to other undertakings if inquiries are received.

London.—TUBE SERVICES IN AIR RAIDS.—The London Passenger Transport Board has issued an announcement explaining the closing of certain Underground railway stations during air raids. The floodgates erected in the tube tunnels under the Thames, in the District Line tunnels between Mansion House and St. James's Park, and a number of stations are shut as a precautionary measure when an air-raid warning is given, with the result that some sections of line and stations are closed to the public. During raids no trains will run on the Northern Line from Strand to Kennington and Moorgate to London Bridge; on the Bakerloo Line from Piccadilly Circus to Elephant and Castle; on the District Line from Mansion House to St. James's Park; and on the East London Line from Shoreditch to New Cross and New Cross Gate.

Sunderland.—UNDERTAKING'S FINANCES.—The Transport Department reports a net profit on the trams last year of £13,316 (against £21,342 in the previous year) and on the bus services a profit of £3,080 (against £6,313). Of this £8,157 is allocated to the reserve and renewals fund, which at March 31st stood at £28,832. After eleven years of losses the Durham Road tram route showed a net profit of £912. The general manager (Mr. C. A. Hopkins) in his report urges an increase of revenue by the withdrawal of the 2d. universal return ticket. He recalls that in February last he suggested to the Council that measures should be taken to increase revenue, but the Council decided to postpone action until the annual report was issued. This, he contends, was an error of judgment and a grave injustice to the undertaking. Unless immediate steps are taken to increase income, not only will the current financial year show a loss, but the Transport Committee's plan to build up a reserve fund for providing an alternative form of transport to the tramways will be a failure. At the end of the war there will undoubtedly be a great influx of motor traffic and notwithstanding the financial success of the trams it is problematical whether it will be possible to operate rail vehicles for any lengthy period. To carry out the change-over from trams to trolley-buses or motor-buses by borrowing would involve a considerable increase in fares.

Enemy Power Station Attacked

ON Tuesday the Air Ministry announced that new targets in Germany and Italy were attacked by aircraft of the Bomber Command on Monday night, including a large power station at Genoa which was bombed from a low altitude. During the past week attacks have also been reported on power stations at Duisburg and Reisholz, in Germany, besides a large works in the north-west of Berlin, thought to be that of Siemens-Schuckert.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

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11793. 'Electrostatic recorders and pick-ups." Steatit-Magnesia Akt.-Ges. April 19th, 1937. (524619.)

30834. "Tuneable coupling system for wide-band amplifiers for short and ultra-short waves. D. S. Loewe Radioakt. Ges. October 26th, 1937. (Cognate Application 30835/38. (524499.)

30873. "Electric inverting or frequency changing device. Allmänna Svenska Elektriska Aktiebolaget. October 29th, 1937. (524620.)

36460. "Systems employing DC saturated inductances." Allmänna Svenska Elektriska Aktiebolaget. December 14th, 1937. (524501.)

37738. "Process for the manufacture of glass-like quartz." A. F. Burgess (Vereinigte Gluhlampen und Elektrizitäts Akt. Ges. December 29th, 1938. (524442.)

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1424. "Television systems." G. Valensi. January 17th, 1938. (Cognate applications, 1425/39 and 1426/39.) (524443.)

2764. "Electrical measuring arrangements." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. January 26th, 1938. (Cognate applications, 2765/39 and 2766/39.) (524444.)

2902. "Electric cables." Siemens Bros. & Co., Ltd., and H. G. Wood. January 27th, 1939. (524388.)

2908. "Grid-controlled electric discharge valves." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. January 27th, 1938. (524446.)

2962. "Electric fuses." V. Hope. January 28th, 1939. (524449.)

2991. "Mountings for coil formers, more especially in wireless apparatus." Plessey Co., Ltd., and F. G. Gillard. January 28th, 1939. (524450.)

2998. "Telegraph systems." K. E. Latimer and V. J. Terry. January 28th, 1939. (524391.)

3061. "Thermally tripped automatic electric circuit-breakers." L. C. Capener and P. V. Gilmore. January 30, 1939. (524398.)

3122. "Multiple electric switch mechanism." Manlove, Alliott & Co., Ltd., W. Hursthouse, and J. M. Hodges. January 30th, 1939. (524407.)

3125. "Operating mechanism more particularly for electric transformer tap-changing switches." General Electric Co., Ltd., and F. Booker. January 30th, 1939. (524456.)

3126. "Regulating arrangements for electrical circuits." H. M. Harmer and A. F. Canut. January 30th, 1939. (Addition to 521314.) (524565.)

3130. "Device for tuning radio sets." M. Yardeny. January 30th, 1939. (524410.)

3138. "Antennæ for short-wave radio transmitters and receivers." Marconi's Wireless Telegraph Co., Ltd. January 29th, 1938. (Cognate applications, 3139/39 and 3140/39 and 3141/39.) (524457.)

3142. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. January 29th, 1938. (524458.)

3148. "Lamp-making apparatus." British Thomson-Houston Co., Ltd. January 29th, 1938. (524414.)

3149. "Electromagnetic control devices." British Thomson-Houston Co., Ltd. January 29th, 1938. (524459.)

3154. "Modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd. January 29th, 1938. (524416.)

3156. "Electron-discharge devices." Telefunken Ges. für Drahtlose Telegraphie. January 28th, 1938. (524417.)

3161. "Manufacture of permanent magnet alloys." F. Krupp Akt. Ges. January 28th, 1938. (524420.)

3233. "Screening of constant voltage dynamos for the prevention of radio interference." J. Marr. January 31, 1939. (524477.)

3248. "Overhead equipment of electric traction systems." British Insulated Cables, Ltd., London Passenger Transport Board, T. C. Broom and H. J. Powell. January 31st, 1939. (524482.)

3251. "Vacuum cut-offs." General Electric Co., Ltd., and D. H. Donaldson. January 31st, 1939. (524506.)

3252. "Coating with luminescent material of the inner surface of a hollow vessel." General Electric Co., Ltd. (Patent-Treuhand Ges. für Elektrische Gluhlampen.) January 31st, 1939. (524507.)

3280. "Electrically heated ovens." O. Uhlendorff. January 31st, 1938. (524516.)

3300. "Coating of glass and like surfaces." Neonelectric Co., Ltd., and O. P. Scarff. January 31st, 1939. (524427.)

3301. "Electric water heater." Hydro Heaters, Ltd., and J. Richardson. January 31st, 1939. (524525.)

3309. "Blind landing systems." Standard Telephones & Cables, Ltd., and L. J. Heaton-Armstrong. January 31st, 1939. (524526.)

3310. "High-frequency coaxial conductor cables." Standard Telephones & Cables, Ltd. March 24th, 1938. (524527.)

3337. "Constant current systems." Standard Telephones and Cables, Ltd., and B. B. Jacobsen. February 1st, 1939. (524627.)

3352. "Motor-operated press-button tuned radio receivers." E. K. Cole, Ltd., A. Shackell and F. W. O. Kennedy. February 1st, 1939. (524537.)

3357. "Brake circuits for electric starters for internal-combustion engines." R. Bosch Ges. February 10th, 1938. (524538.)

3388. "Lighting fittings." G. D. Skinner and Benjamin Electric, Ltd. February 1st, 1939. (524573.)

3390. "High-pressure metal-vapour electric discharge devices." General Electric Co., Ltd., V. J. Francis and E. Kettlewell. February 1st, 1939. (Addition to 504120.) (524574.)

3394. "Electric supply systems for unilaterally conductive load devices." British Thomson-Houston Co., Ltd. February 1st, 1938. (524576.)

3397. "Earthing devices for use in connection with truck-type switchgear." British Thomson-Houston Co., Ltd., and H. Trencham. February 1st, 1939. (524578.)

3407. "Electromagnetic regulators." F. Newton. February 1st, 1939. (524580.)

3427. "Thermionic valve apparatus." E. K. Sandeman and H. L. Kirke. February 1st, 1939. (524588.)

3433. "Electric light fittings." N. Dennes, and Metropolitan-Vickers Electrical Co., Ltd. February 1st, 1939. (524589.)

3457. "Electric switches of the coiling or pull-operated type." J. A. Crabtree and Co., Ltd., H. F. McLoughlin and B. G. Harrison. February 2nd, 1939. (524599.)

3470. "Screening caps for sparking plugs." R. Bosch Ges. February 26th, 1938. (524601.)

3493. "Thermostatically-controlled electric immersion heaters." R. Mingo. February 2nd, 1939. (524629.)

3505. "Adjustable bearings, more particularly for measuring instruments and the like." English Electric Co., Ltd., and G. Tilstone. February 2nd, 1939. (524633.)

3506. "Means for supporting piezo-electric elements." General Electric Co., Ltd., and R. F. Proctor. February 2nd, 1939. (524605.)

3515. "Electric lamps and fittings." A. H. Curtis. February 2nd, 1939. (524636.)

3516. "Motor control apparatus." Allen West and Co., Ltd., and W. J. Paddock. February 2nd, 1939. (524606.)

3562. "Submarine high-frequency electric cables." Telegraph Construction and Maintenance Co., Ltd., and E. W. Smith. February 2nd, 1939. (524610.)

3566. "Direction-finding aerial systems." Telefunken Ges. für Drahtlose Telegraphie. February 2nd, 1938. (524652.)

3567. "Radio direction finders." Telefunken Ges. für Drahtlose Telegraphie. February 2nd, 1938. (524653.)

3655. "Electrical condensers." Standard Telephones and Cables, Ltd., J. C. Edwards and P. W. Larsen. February 3rd, 1939. (524657.)

3658. "Electron multipliers." Standard Telephones and Cables, Ltd., and A. I. Vangeen. February 3rd, 1939. (524658.)

3660. "Thermionic valves." Standard Telephones and Cables, Ltd., and F. D. Goodchild. February 3rd, 1939. (524659.)

3689. "Electric insulators." Bullers, Ltd., and H. C. R. Dagnall. February 3rd, 1939. (524663.)

3764. "Furnaces for the treatment of circular billets and similar articles." H. G. Lindner and G. W. B. Electric Furnaces, Ltd. February 4th, 1939. (524664.)

3984. "Operating mechanism for electric transformer tap-changing switches." General Electric Co., Ltd., and G. G. Morris. February 7th, 1939. (524485.)

4013. "Electric signalling systems." Kolster-Brandes, Ltd., and W. A. Beatty. February 7th, 1939. (524671.)

4014. "Control of television receivers." Kolster-Brandes, Ltd., and C. L. Smyth. February 7th, 1939. (524672.)

4015. "Electrical transformers." Standard Telephones and Cables, Ltd., and W. F. Glover. February 7th, 1939. (524673.)

4016. "Electric communication cables." Standard Telephones and Cables, Ltd., E. Baguley and A. L. Long. February 7th, 1939. (524674.)

11715. "Wide-band coupling systems for electric circuits." Hazeltine Corporation. April 22nd, 1938. (524547.)

11717. "Two-terminal low-pass coupling systems with electric circuits." Hazeltine Corporation. April 22nd, 1938. (524548.)

11718. "Wide-band coupling systems for electric circuits." Hazeltine Corporation. April 22nd, 1938. (524549.)

14624. "Electric motors, particularly applicable to hair clippers." J. Oster. May 16th, 1939. (524492.)

19898. "Wide-band amplifier systems for electrical carrier-wave signals." Hazeltine Corporation. August 16th, 1938. (524550.)

24914. "Conductor systems of electrical apparatus." Philips Lamps, Ltd., September 2nd, 1938. (524429.)

24915. "Producing conductor systems for electrical apparatus." Philips Lamps, Ltd. September 2nd, 1938. (524430.)

24997. "Conductor systems of electrical apparatus." Philips Lamps, Ltd. September 3rd, 1938. (524431.)

25226. "Electric apparatus." Philips Lamps, Ltd. September 5th, 1938. (524432.)

25267. "Electric apparatus." Philips Lamps, Ltd. September 6th, 1938. (524433.)

25268. "Electric apparatus." Philips Lamps, Ltd. September 7th, 1938. (524434.)

25270. "Electric apparatus." Philips Lamps, Ltd. September 8th, 1938. (524435.)

25271. "Electric apparatus comprising a system of conductors produced by a die-casting process." Philips Lamps, Ltd. September 6th, 1938. (524436.)

28132. "Recording equipment such as for telecommunication exchange systems." Standard Telephones and Cables, Ltd., E. P. G. Wright and G. E. Peters. January 28th, 1939 (divided out of 524364). (524497.)

I.E.E. Western Centre

THE annual report of the Western Centre of the Institution of Electrical Engineers shows the local membership to have increased by 147 to 1,023. Meetings held this year at Cardiff and Bristol attracted a slightly larger average (54) attendance of members, though fewer visitors attended; the average number taking part in discussions was nine. At the West Wales (Swansea) Sub-centre meetings the attendance averaged 30. The Devon and Cornwall Sub-centre and the Bristol Students' Section were unable to arrange programmes.

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.

New Companies Registered

E. Heins & Son (Radio), Ltd.—Private company. Registered August 23rd. Capital £1,000. Objects: To carry on the business of manufacturers of and dealers in wireless, musical and electrical appliances, &c. The permanent directors are: L. Heins, 17, Harwood Road, Rishton, Lancs, and N. Butterworth, 22, Fielden Street, Rishton. Registered office: 11, High Street, Rishton, Lancs.

Acme Welders (Metal Workers), Ltd.—Private company. Registered August 28th. Capital £1,000. Objects: To acquire the business of an electric and gas welder and structural engineer carried on by L. Jamison as "Acme Welders," at 37a, Travis Street, Manchester. The directors are: Mrs. C. M. Jamison and L. Jamison, both of 4, North Road, Droylsden, Lancs. Secretary: A. J. Shaw. Registered office: 37a, Travis Street, London Road, Manchester.

Switchgear Units, Ltd.—Private company. Registered August 26th. Capital £500. Objects: To carry on the business of manufacturers and repairers of and dealers in switchgear of all kinds, dynamos, motors, armatures, magnetos and batteries, &c. The directors are: M. L. Cooper, "Hillside," Disley, Ches; T. Smalley, 34, Monton Green, Monton, near Eccles, Lancs; R. Dale, 30, Ferndene Road, Withington, Manchester; and C. Bickerton, 5, Audenshaw Hall Grove, Fairfield, Manchester. Secretary: G. Griffiths, 39, Sutherland Road, Firswood, Manchester. Registered office: Unit Works, Pendleton, Manchester.

M. Allen (Radio), Ltd.—Private company. Registered August 30th. Capital, £100. Objects: To carry on the business of dealers in wireless goods and accessories, and electrical goods and fittings, &c. Subscribers: Mrs. E. B. Apple, 62a, Ridgmount Gardens, London, W.C.1, and F. J. Walker, 42, Tonbridge House, Tonbridge Street, London, W.C.1. Secretary (*pro tem.*): M. Roberts. Registered office, 79a, Tottenham Court Road, W.1.

Rowland Engineering Co. (Surrey), Ltd. — Private company. Registered August 31st. Capital, £100. Objects: To carry on business as manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, electrical plant, &c. Subscribers: Wm. C. W. Baker, Keyham, West Bank, Dorking, and H. C. Brassington, 12a, Cleardene, Dorking. Secretary: W. C. W. Baker.

Berners and Berners, Ltd.—Private company. Registered August 29th. Capital, £500. Objects: To carry on the business of manufacturers of and wholesale and retail dealers in and agents for manufacturers of, and to engage in the salvage of, general electrical appliances and equipment, dry batteries and components, battery making machines, &c. Directors: N. C. Alsop, 19, St. Edmunds Avenue, Ruislip; and Miss I. F. Berners, 70, The Lawn, Shepherd's Bush, W.12. Registered office: 1, Warwick Street, W.1.

Companies' Returns

Statements of Capital

British Columbia Electric Railway Co., Ltd.—Capital £6,320,000, in £1,440,000 5 per cent. cumulative perpetual preference stock, £1,440,000 preferred ordinary stock, £2,406,103 deferred ordinary stock, and 1,033,897 unissued shares. Return dated February 23rd, 1940. All stock issued and fully paid up. Mortgages and charges: £278,817.

British Thomson-Houston Co., Ltd.—Capital £4,000,000, in 2,000,000 7 per cent. cumulative preference and 2,000,000 ordinary shares. Return dated April 3rd. 1,500,000 preference and 2,000,000 ordinary shares taken up. £3,425,310 paid. £74,690 considered as paid. Mortgages and charges: £1,240,740.

Erskine, Heap & Co., Ltd.—Capital £50,000 in 10s. shares. Return dated April 11th, 1940. 94,978 shares taken up. £4,913 paid on 9,826 shares. £42,576 considered as paid on 85,152 shares. Mortgages and charges nil.

Mid-Cheshire Electricity Supply Co., Ltd.—Capital £1,000,000, in 300,000 4 per cent. cumulative preference, 10,000 5 per cent. cumulative preference, 60,525 7 per cent. cumulative preference, 379,127 ordinary, and 250,348 unclassified shares, all of £1. Return dated April 12, 1940. 300,000 4 per cent. preference, 10,000 5 per cent. preference, 60,525 7 per cent. preference, and 379,127 ordinary shares taken up. £747,188 4s. 4d. paid, leaving £1,647 15s. 8d. calls unpaid. £816 considered as paid. Mortgages and charges nil. Returns of allotments, made up to July 15, 1940, show a further 150,000 shares allotted as fully paid as consideration for the transfer to this company of ordinary shares of the Mersey Power Co., Ltd.

Submarine Signal Co. (London), Ltd.—Capital £1,000, in £1 shares. Return dated April 12th, 1940. 1,000 shares taken up. £1,000 paid. Mortgages and charges nil.

Midland Electric Corporation for Power Distribution, Ltd.—Capital £1,150,000, in 200,000 preference and 950,000 ordinary shares of £1. Return dated April 16th, 1940. 200,000 preference and 933,333 ordinary shares taken up. £834,605 paid on 134,605 preference and 700,000 ordinary shares. £298,728 considered as paid on 65,395 preference and 233,333 ordinary shares. Mortgages and charges: £600,000.

Vickers, Ltd.—Capital, £26,500,000 in 23,684,516 ordinary shares of 10s., £6,157,742 ordinary stock, 136,193 cumulative preference shares of £1, £6,863,807 cumulative preference stock, £750,000 5 per cent. preference stock, and £750,000 preferred 5 per cent. stock. Return dated April 27th. £6,157,742 ordinary stock, £6,863,807 cumulative preference stock, £750,000 5 per cent. preference stock and £750,000 preferred 5 per cent. stock taken up. £4,520,673 13s. 4d. paid. £10,000,875 6s. 8d. considered as paid. Mortgages and charges, £994,846.

Melton Mowbray Electric Light Co., Ltd.—Capital, £60,000 in £5 shares. Return dated April 29th. 9,600 shares taken up. £48,000 paid. Mortgages and charges, £19,100.

Cambridge Electric Supply Co., Ltd.—Capital, £600,000 in £1 shares. Return dated May 1st. 500,000 shares taken up. £500,000 paid. Mortgages and charges, £30,000.

Peacehaven Electric Light and Power Co., Ltd.—Capital, £20,000 in 962 10 per cent. preference shares of £1, 14,038 10 per cent. preference shares of 12s., and 212,304 ordinary shares of 1s. Return dated May 1st. 13,883 12s. preference and 16,027 ordinary shares taken up. £9,131 3s. paid. Mortgages and charges, £8,170.

Ilfracombe Electric Light and Power Co., Ltd.—Capital, £50,000 in £5 shares. Return dated May 3rd. All shares taken up. £50,000 paid. Mortgages and charges, nil.

Brentford Electric Supply Co., Ltd.—Capital £100,000, in £1 shares. Return dated March 5th, 1940. 90,000 shares taken up. £90,000 paid. Mortgages and charges nil.

Electric Cables, Ltd.—Capital, £2,000 in £1 shares. Return dated May 7th. 1,000 shares taken up. £1,000 paid. Mortgages and charges, nil.

Concordia Electric Safety Lamp Co., Ltd.—Capital £100,000, in £1 shares. Return dated April 18th, 1940. All shares taken up. £100,000 paid. Mortgages and charges nil.

Key Engineering Co., Ltd.—Capital, £12,000 in £1 shares. Return dated April 18th. 11,650 shares taken up. £11,650 paid. Mortgages and charges, nil.

Mortgages and Charges

A. Saunders, Ltd.—Mortgage on moneys due under a contract, dated August 2nd, 1940, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

J. G. Smithson & Co., Ltd.—Mortgage on moneys due under certain contracts, dated August 15th, 1940, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £300.

Whitehead Switchgear & Inventions, Ltd.—Mortgage on moneys payable under certain contracts, dated August 16, 1940, to secure sums not exceeding £10,000. Holders: Barclays Bank, Ltd.

Peto Scott Electrical Instruments (Holdings), Ltd.—Charge on moneys due or to become due under certain contracts, dated August 19th, 1940, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Star Lampshade Manufacturing Co., Ltd.—Satisfaction to the extent of £750 (full discharge) on August 15th, 1939, of debenture dated June 3rd, 1939, and registered June 7th, 1939. (Notice filed August 27th, 1940.) (According to the register of mortgages, the debenture registered June 7th, 1939, originally secured all moneys due to bank.)

Leach Electrical & Engineering Co., Ltd.—Satisfaction to the extent of £450 on July 1st, 1940, of debentures authorised June 27th, 1939, and registered July 10th, 1939, securing £2,250.

North-Eastern Electric Supply Co., Ltd.—Satisfaction to the further extent of £17,506 on July 31st, 1940, of trust deed authorised October 31st, 1930, and registered November 8th, 1930, securing £2,300,000 5 per cent. consolidated debenture stock.

Company Liquidations

Springvale Electrical Co., Ltd., Nouvelle Works, Springvale Corner, Brentford.—Under the compulsory liquidation of this company the first meetings of creditors and shareholders were held on August 29th at Bankruptcy Buildings, Carey Street, W.C., before Mr. Sanders, Assistant Official Receiver. The statement of affairs shows ranking liabilities of £13,590 against assets of £6,850, after deducting £586 for payment of the preferential claims. The issued capital is returned at £3,000 and consists of shares allotted as purchase consideration for the business.

The company was formed in October, 1938, to acquire the business of electrical contractor and exhibition stand fitter carried on by Mr. G. H. Armitage at the above address under the style of Springvale Electrical Co. and Springvale Exhibition Stand Fitting Co. The business was founded in 1915 and was carried on for many years with success. The first year's trading by the company was quite successful, but on the outbreak of war all plans for the 1940 season exhibitions were cancelled, with the result that the company practically ceased business. A resolution was passed in January, 1940, for voluntary liquidation, and Mr. E. E. Osmond, the voluntary liquidator, carried on the business until last May, when the stock, plant and effects were sold by public auction. The company's failure is attributed solely to the outbreak of hostilities. The liquidation was left in the hands of the Official Receiver.

Fordham Electrical Enginering Co., Ltd., 150, Southampton Row, London, W.C.—Meetings of creditors and shareholders under the compulsory liquidation of this company were held on August 28th at the Board of Trade Offices, Carey Street, W.C. The statement showed liabilities of £1,501 against assets of £224 and an issued capital of £226. The company was formed in 1926 to carry on

(*Continued on page* 211.)

STOCKS AND SHARES

TUESDAY EVENING.

IN spite of daily air-raid warnings the Stock Exchange markets are endeavouring to carry on, although the warnings tend to place a further restraint upon what business continues to be conducted. The average number of daily bargains is about 2,000 which, if divided up between members now in the House, would mean one bargain per man per diem. This gives some idea of the meagre character of the daily dealings.

Prices keep very steady. Investment stocks, under the leadership of the War Loan, have an upward tendency, and the shortage of supply, in the principal industrial departments, continues to be an outstanding feature.

War Prices

This week, marking as it does the first anniversary of the war, has given rise to many inquiries as to the manner in which Stock Exchange prices have moved during the twelvemonth now passed. Without going to the length of setting out a long catalogue of fluctuations, it is of interest to compare representative examples, giving the prices of to-day and those of a year ago. Here is a brief selection :—

Company	Sept. 7, 1939	Now	Rise (+) or Fall (−)
City of London	29/–	21/6	− 7/6
Clyde Valley	33/9	30/9	− 3/–
County of London	38/–	28/9	− 9/3
Edmundson's Ord.	22/6	23/–	+ –/6
Isle of Thanet	18/–	6/–	−12/–
Lancs Light & Power	28/9	26/3	− 2/6
Lond. Assoc. Elec.	23/3	15/–	− 8/3
Metropolitan	41/3	28/9	−12/6
Mid. Elec. Power	33/9	31/3	− 2/6
Morthmet Power Ord.	38/9	28/9	−10/–
Scottish Power	31/3	28/9	− 2/6
Yorkshire Elec.	32/6	28/9	− 3/9
Cent. Elec. 1950/70	103	104½	+ 1½
Lond. Elec. Trans. Gtd.	83	90	+ 7
Lond. Pass. Trans. :			
A	103	107	+ 4
C	65	28	− 37
Amer. Tel. & Tel.	195	190	− 5
Anglo-Am. Tel. Pref.	91½	89	− 2½
Anglo-Portuguese	20/–	12/6	− 7/6
Cable & Wireless :			
5½% Pref.	82½	86	+ 3½
Ord.	47½	48	+ ½
Globe Tel. & Tel. Ord.	28/9	25/–	− 3/9
Brit. Elec. Traction Def. Ord. ...	750	600	−150
Southern Rly. :			
5% Prefd.	55	44	− 11
5% Pref.	80	75	− 5
T. Tilling	45/–	33/9	−11/3

Industrials' Changes

The following changes of price in the shares of companies dealing with the manufacturing and equipment branches are also representative of the various groups engaged in the trade :—

Ordinary Shares	Sept. 7, 1939	Now	Rise (+) or Fall (−)
Assoc. Elec.	38/6	35/–	− 3/6
Brit. Alum.	3	34/6	−25/6
Brit. Insulated	72/6	4½	+10/–
Callender's	3	52/6	− 7/6
Crompton Parkinson	17/6	15/–	− 2/6
Elec. & Mus. Ind.	9/3	6/6	− 2/9
Enfield Cable	2½	45/–	− 5/–
English Electric	33/–	25/–	− 8/–
Ever Ready	20/–	24/–	+ 4/–
General Electric	75/–	70/–	− 5/–
Henley's	17/6	16/3	− 1/3
Johnson & Phillips	38/9	40/–	+ 1/3
Murex	3½	70/–	− 7/6
Siemens	21/3	17/6	− 3/9
Tube Investments	86/3	81/3	− 5/–
Vickers	17/9	13/3	− 4/6
West, Allen	5/9	3/9	− 2/–

"City Lights"

The City of London Electric Lighting Company having reduced its interim dividend from 3½ per cent. to 3 per cent. is expected to make a similar reduction for the full twelvemonths. For 1939 the dividend was 7½ per cent.; a rate which has been paid for years past, though last time the distribution involved scraping the pot pretty clean. The blackout, the evacuation, the rise in costs, have told against the London companies which, unlike those in the provinces, have not the advantage of so many factory and munition customers whose demand helps to compensate for the adverse factors.

It is yet, however, too early to do more than guess vaguely at the company's final dividend for the year, although 6 per cent. against the previous 7½ per cent. seems to be a conservative estimate. The price of the shares remains unchanged at 21s. 6d. ex dividend.

Provincial Suppliers

The provincial electricity companies are to some extent better off than the London suppliers, for the reason that they have found a greatly increased demand for their power from consumers now engaged on Government work. Owing to this, the impression prevails that the provincial electricity supply companies will have little difficulty in maintaining their previous distributions, and the investor of to-day is more inclined to take an interest in the country undertakings than in those of the Metropolis. Business in both classes of shares is anything but active; the supply available in the majority of cases barely suffices to meet even the small demand that there is for these shares.

Equipment and Manufacturing

Callender's Cable ordinary shares are 2s. 6d. higher at 52s. 6d. Others in this group maintain a steadiness that gives a modest appearance to the yields offered at to-day's prices. Some people say that having lent to the Government all they can afford at 2½ to 3 per cent., they are obliged to look for 7½ to 10 per cent. on the remainder of their capital, in order to raise the average yield. To them appeal such shares as Ever Ready, paying 8¾ per cent., Walsall Conduits 9¼, Johnson & Phillips 7½, Siemens 8½, English Electric 8, and others. Callender's, British Insulated, General Electric, Tube Investments all pay rather less than 6 per cent., and, what is more, the shares are none too easy to buy. Henley's give £6 3s. per cent. at the current middle price of 16s. 3d. Crompton Parkinson at 15s. and Electric Construction at 30s. both afford 6¾ per cent. The point to be observed is that investment thinks so well of the middle group of these shares—Callender's, British Insulated, etc.—as to be prepared to give prices that pay an average yield below 6 per cent. Study of the return per cent. given in the final column of our tables is always a matter of interest—in both senses of the word.

Stop Press Prices

The Stock Exchange quota of paper required for publication of the daily Official Lists having been reduced from 40 tons per quarter to one ton per week—as mentioned here last month—compulsory economy has cut out several hundreds of securities from regular quotation. The prices thus eliminated are of shares in which transactions rarely occur. As, however, it is a Stock Exchange rule that the prices of all bargains must be recorded, a new plan has been introduced whereby, in special columns, transactions are marked that relate to the shares for which there is no longer a daily record. Aron Electricity Meter shares are a case in point. For weeks, no dealings took place in the shares, although the nominal price fell sharply, to 10s., on the passing of the dividend. On Friday, August 23rd, a buyer appeared, and gave 14s. This was duly published in the newly instituted column in the Stock Exchange List, and the price, until superseded by a later bargain, will presumably govern valuations for death and estate duties. Electric Construction 7 per cent. preference changed hands last Friday at 25s. On the previous day, Brush Electrical 4½ per cent. second debenture stock was dealt in at 78.

Air Raid Effects

Air raids having become part of the daily programme, the Stock Exchange, like the ordinary individual, adapts itself to what is now regarded as being little more than a nuisance. "And I was on the point of dealing!" a broker will regretfully remark as he turns out of the Stock Exchange to seek shelter elsewhere. Klaxons that make a fearsome noise blare out in various markets the message of warning. It is impossible to hear anyone speak, shout he never so loudly, while the Stock Exchange sirens are vocal. Upon the "All Clear" being sounded, members promptly return to the markets. It must be admitted that the air raids have no effect worth noting other than that of causing temporary disturbance to business. Occasional inconvenience arises through delay, for which an air raid may be responsible, in the way of holding up the arrival of letters; in drawing out, or paying in money at the bank. But customers at the banks are apt to find that normal rules are susceptible of relaxation. In short, the present air-raid phase, considering its persistence and its extent, is exercising remarkably little influence over financial business affairs in the City.

Shares on Offer

Five hundred Tilling and British Automobile Traction 8 per cent. participating preference shares can be obtained in the Stock Exchange market at 42s., ex the dividend just paid. The annual dividend service for these shares requires £20,000 and the amount available on the last published profits was £488,000. After the ordinary have received 3.84 per cent., the preference participate up to a further 2 per cent., making a total dividend of 10 per cent. per annum. This latter has been regularly paid for each of the past ten years. The yield on the 10 per cent. dividend, at 42s., is £4 15s. 3d., and, as the figures show, the dividend service is well margined.

For investment which is attracted to sound security standing below par, mention may be made of 1,000 Bristol Tramways and Carriage 4 per cent. preference, now on offer at 18s. 6d., January and July dividends. At this price the yield is £4 6s. 6d. The dividend requires £20,000 per annum and in last year's figures there was £238,000 available to meet it. The yield is comparatively modest, but nowadays it is none too easy a matter to find well-secured fixed dividend shares standing below their par value.

D

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price Sept. 3	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole ...	63/6	41/6	15	15	40/-xd	...	—
British Power and Light ...	30/-	21/-	7	7	22/6	...	6 4 4
City of London	28/-	20/-	7½	7½	21/6xd	...	—
Clyde Valley	38/6	25/-	8	8	30/9xd	...	5 4 1
County of London... ...	43/3	22/-	10½	10½	28/9	—⅛	7 6 0
Edmundson's:							
7% Pref....	31/6	26/3	7	7	28/3	...	4 19 1
Ord.	27/6	18/6	9	6	23/-	...	5 4 4
Elec. Dis. Yorkshire ...	40/3	32/6	9	9	32/6	...	5 10 9
Elec. Fin. and Securities ...	41/3	38/6	12½	12½	38/9	...	6 9 0
Elec. Supply Corporation...	46/3	37/-	12	11½	37/6	...	6 2 8
Isle of Thanet	16/-	5/6	4	4	6/-	...	13 6 8
Lancs Light and Power ...	33/-	25/-	7½	7½	26/3	...	5 14 3
Llanelly Elec.	21/-	17/-	5½	5½	17/6	...	6 5 9
Lond. Assoc. Electric ...	21/-	12/6	7	5½	15/-	...	—
London Electric	37/6	19/-	8	7	20/-	...	7 0 0
London Power Deb. Red....	105½	101	5	5	100½xd	...	4 9 6
Metropolitan	41/6	23/6	12	10	28/9	...	6 19 2
Midland Counties	39/-	24/3	8	8	28/9	+⅛	5 11 5
Mid. Elec. Power	40/-	29/6	9	9	31/3	...	5 12 2
Newcastle Elec.	29/9	24/6	7	7	24/6	...	5 14 3
North Eastern Electric:							
Ordinary...	31/6	17/6	7	7	22/6	...	6 11 9
7% Pref....	32/6	26/6	7	7	27/6	...	5 1 10
Northampton	48/-	39/-	10	10	38/9	...	5 3 3
Notting Hill 6% Pref. (£10)	10¾	9	6	6	9	...	—
Northmet Power:							
Ordinary...	42/3	23/-	10	10	28/9	...	—
6% Pref....	29/-	23/-	6	6	26/-	...	4 12 4
Richmond Elec.	24/6	18/-	7	6	20/-	...	—
Scottish Power	38/-	24/-	8	8	28/9	...	5 11 4
Southern Areas	21/3	13/9	5	5	13/9	...	7 5 6
South London	23/3	20/-	7	7	20/-	...	7 0 0
West Devon	20/-	18/6	5	5	20/-	...	5 0 0
West Glos.	21/3	15/-	2½	4½	16/3	...	5 13 10
Yorkshire Elec.	40/-	24/6	8	8	28/9	...	5 11 5
Overseas Electricity Companies							
Atlas Elec.	4/-	1/3	Nil	Nil	1/9	...	—
Calcutta Elec.	37/-	22/6	10*	8*	28/-	...	5 14 6
Cawnpore Elec.	30/-	24/-	10	10	25/-	...	8 0 0
East African Power ...	25/6	20/-	7	7	20/-	...	7 0 0
Jerusalem Elec.	24/-	17/9	7	7	18/9	...	7 9 4
Kalgoorlie (10/-)	12/6	9/6	7½	7½	11/-	...	6 16 5
Madras	26/9	25/-	8*	6*	25/-	...	4 16 0
Montreal Power	35½	30	1½	1½	32	...	—
Palestine Elec. "A" ...	25/-	13/-	5*	Nil	13/9	...	—
Perak Hydro-electric ...	20/3	13/6	6	2½	13/9	...	3 12 9
Shawinigan Power ...	27½	19	83cts.	90cts.	20½	...	—
Tokyo Elec. 6%	69	52	6	6	52½	...	11 8 6
Victoria Falls Power ...	75/9	56/-	15	15	65/-	...	4 12 4
Whitehall Investments Pref.	17/9	8/-	7½	7½	9/6	...	15 16 0
Public Boards							
Central Electricity:							
1950–70	110½	104	5	5	104½	...	4 15 8
1955–75	112½	106	5	5	105½xd	...	4 15 3
1951–73	107½	102	4½	4½	102½	...	4 7 10
1963–93	96½	90	3½	3½	90	...	3 17 9
London Elec. Trans Gtd. ...	92	87½	2½	2½	90	+1	2 15 2
London & Home Counties							
1955–75	113½	105	4½	4½	105½	...	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	107	...	4 4 0
B	116	102½	5	5	104½	...	4 15 8
C	65½	25	1½	1½	28	...	5 7 2
West Midland Joint Elec.							
1948–68	106½	105	5	5	103½xd	...	4 16 9
Telegraph and Telephone							
American Tel. & Tel. ...	215	180	9	9	190	...	4 14 9
Anglo-Am. Tel.:							
Pref.	106	85	6	6	89	+2	6 14 10
Def.	23½	18	1½	1½	18½	...	8 2 2
Anglo-Portuguese	22/6	10/-	8	8	12/6	+⅛	12 16 0
Cable & Wireless:							
5½% Pref.	99½	70	4½	5½	86	...	6 8 0
Ord.	65	28½	4	4	48	...	8 5 0
Income	99½	93	...	...	97	...	4 2 4
Canadian Marconi $1 ...	6/-	4/-	Nil	4cts.	4/3	...	—
Globe Tel. & Tel.:							
Ord.	32/6	21/6	7½*	6*	25/-	...	4 16 0
Pref.	22/9	22/6	6	6	23/9	...	5 1 1
Great Northern Tel. (£10).	20	11	20	20	12½	...	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	...	—
Marconi-Marine	30/-	18/3	10	7½	18/9	...	8 0 0
Oriental Telephone Ord. ...	2¾	48/-	12*	11½*	2½	...	4 12 0
Telephone Props.	15/-	11/-	5	6	12/6	...	9 12 0
Telephone Rentals (5/-) ...	9/6	5/9	10	10	5/9	...	8 14 0
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	4/3	1/3	Nil	Nil	2/-	...	—
4% Inc.	11½	2	Nil	Nil	3½	...	—
British Electric Traction:							
Def. Ord.	830	440	5	45	600	...	7 10 0
Pref. Ord.	169	134	8	8	140	...	5 14 3
Bristol Trams	48/6	34/6	10	8*	35/-	...	—
Brazil Traction	12½	5½	$1	50c.	5½	...	—
Calcutta Trams	24/-	16/3	8	5½	17/-	...	6 9 4
Cape Elec. Trams	18/6	16/-	5	5	17/-	...	5 17 8
Lancs Transport	35/-	27/6	10	10	30/-	...	6 13 4
Mexican Light:							
1st Bonds	33	27	5	5	27½	...	—
Rio 5% Bonds	90	74	5	5	80	...	6 5 0
Southern Rly.:							
5% Prefd.	79	35	5	5	44	—2	11 7 4
5% Pref....	104½	90	5	5	75	—2	6 13 4
T. Tilling	45/9	31/-	10	10	33/9	...	5 18 6
Tilling & B.A.	47/6	43/9	9*	8*	45/-	...	—
West Riding	35/-	26/-	10	10	30/-	+3/-	6 13 4
Equipment and Manufacturing							
Aron Electricity Ord. ...	17/6	10/-	15	Nil	14/-	+4/-	—
Assoc. Elec.:							
Ord.	43/3	27/-	10	10	35/-	...	5 14 4
Pref.	35/3	32/3	8	8	33/9	...	4 14 10
Automatic Telephone & El.	47/3	32/-	12½	12½	35/-	...	7 2 10
Babcock & Wilcox ...	50/-	28/6	10	11	32/6	...	6 15 4
British Aluminium Ord. ...	56/-	33/-	12½	12½	34/6	...	6 5 0
British Insulated Ord. ...	92/6	67/-	20	20	72/6	...	5 10 4
British Thermostat (5/-) ...	14/9	6/6	18½	18½	7/6	...	12 6 8
British Vacuum Cleaner(5/-)	12/6	5/-	40	12½	6/3	...	10 0 0
Brush Ord....	4/6	1/9	Nil	Nil	2/6	...	—
Callender's	69/-	46/-	15	15	52/6	+½	5 14 3
Chloride Elec. Storage ...	72/6	55/-	15	15	2½	...	5 4 4
Consolidated Signal ...	72/6	59/-	36½	17	60/-	...	5 13 4
Crabtree (10/-)	24/9	17/6	17½	17½	20/-	...	8 15 0
Crompton Parkinson:							
Ord. (5/-)	20/-	12/6	30	20	15/-	...	6 13 4
E. K. Cole (5/-)	5/-	2/6	10	Nil	3/-	...	—
Elec. & Musical Industries							
(10/-)	10/3	4/3	5	Nil	6/6	...	—
Electric Construction ...	36/3	30/-	13½	10	30/-	...	6 13 4
Enfield Cable Ord. ...	56/-	40/6	25	16¼	45/-	...	7 13 0
Electrical Switchgear (10/-)	22/6	20/-	16	10	20/-	...	5 0 0
English Electric	33/9	16/6	10	10	25/-	...	8 0 0
Ensign Lamps (5/-) ...	15/3	13/9	25	25	13/9	...	9 1 10
Ericsson Tel. (5/-) ...	39/3	25/-	25*	25*	25/-	...	5 0 0
Ever Ready (5/-)	28/3	17/3	30	40	24/-	...	8 6 8
Falk Stadelmann	18/3	12/6	6	7	13/9	...	8 14 6
Ferranti Pref.	25/-	23/-	7	7	23/3	...	6 0 5
G.E.C.:							
Pref.	32/6	27/-	6½	6½	28/9	...	4 10 6
Ord.	83/3	56/-	20	20	70/-	...	5 14 3
Greenwood & Batley ...	25/6	20/-	15	13	20/-	...	13 0 0
Hall Telephone (10/-) ...	18/6	8/9	15	10	10/-	+⅛	10 0 0
Henley's (5/-)	21/6	13/6	20	20	16/3	...	6 3 1
4½% Pref.	21/3	20/6	4½	4½	21/3	...	4 4 8
Hopkinsons	46/9	33/6	12½	15	35/-	...	8 11 6
India-Rubber Pref. ...	21/-	20/-	5½	5½	20/9	...	5 6 0
Intl. Combustion	121/3	70/-	32½	32½	4	...	8 2 6
J. Lucas	60/6	40/-	15	15	50/-	...	6 0 0
Johnson & Phillips ...	50/9	33/-	12½	15	40/-	...	7 10 0
Lancashire Dynamo ...	59/9	47/6	25	20	47/6	...	8 8 5
Laurence Scott (5/-) ...	11/-	6/-	15	15	8/-	...	9 7 6
London Elec. Wire ...	25/6	20/-	7½	7½	22/6	...	6 13 4
Mather & Platt	46/6	30/-	13½	10	32/6	...	6 3 1
Metropolitan Elec. Cable Pf.	22/-	21/3	5½	5½	21/3	...	5 3 6
Murex	86/9	52/6	20	20	70/-	...	5 14 4
Pye Deferred (5/-) ...	9/-	6/9	25	25	8/9	...	14 5 8
Revo (10/-)	20/9	12/6	17½	5	12/6	...	4 0 0
Reyrolle	60/6	41/-	12½	12½	43/9	+⅛	5 14 2
Siemens Ord.	23/9	16/3	7½	7½	17/6	...	8 11 6
Strand Elec. (5/-) ...	2/3	9d.	10	4	1/3	...	10 0 0
S. Smith (1/-)	8/-	3/6	37½	50	5/-	...	10 0 0
Switchgear & Cowans (5/-)	11/9	5/6	20	10	6/3	...	8 0 0
Telegraph Condenser (10/-)	8/9	6/3	5	—	8/9	...	—
Telegraph Construction ...	42/6	29/-	10	10	30/0	...	6 13 4
Telephone Mfg. (5/-) ...	9/-	5/-	9	9	5/6	...	8 3 8
Tube Investments... ...	96/9	61/3	23¾	23¾	81/3	+⅛	5 17 9
Vactric (5/-)	3/6	2/-	4	Nil	2/3	...	—
Vickers (10/-)	22/-	9/6	10	10	13/3	+3d.	7 11 0
Ward & Goldstone (5/-) ...	19/9	12/6	20	20	12/6	...	8 0 0
Westinghouse Brake ...	46/-	32/9	17½	10	32/6	...	6 3 1
Walsall Conduits (4/-) ...	26/6	17/6	55	55	23/9	...	9 5 0
West, Allen (5/-)	7/-	3/-	10	7½	3/9	...	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia. — SYDNEY. — October 24th. County Council. One 50-000-kW steam turbo-alternator set for the Bunnerong power station. (T. 16057/40.)*

MELBOURNE.—State Electricity Commission. October 15th. 4,000 ft. of cable for use on a three-phase 6.6-kV system. (T. 21227/40.)*

Birmingham.—September 27th. Electric Supply Committee. Storage batteries and charging equipment for Hams Hall "B" power station. (See this issue.)

Halifax. — Corporation. Electrical work in connection with the erection of 29 public shelters. Borough engineer, Crossley Street, Halifax.

Manchester.—September 14th. Waterworks Committee. Three electrically driven centrifugal pumps, with motor starters, pipes, valves, &c. (August 23rd.)

September 16th. Electricity Committee. Supply and erection over a period of two years of 3-phase, 6,600-V substation switchgear. (August 30th.) September 19th. Three water-tube boilers and auxiliaries, &c. (August 30th.)

Newcastle-on-Tyne. — City Council. Emergency generator set for the control centre. P. Parr, city engineer, Town Hall.

New Zealand. — WELLINGTON.—October 8th. Public Works Department. 20,000-kVA synchronous condenser with control and protective equipment. (T. 21199/40.)* Four 2,500-kVA transformers or alternatively eight 1,677-kVA transformers. (T. 21197/40.)*

October 15th.—66-kV outdoor switchgear and steelwork for Winton substation. (T. 21206/40.)*

South Africa.—PRETORIA.—Union Tender and Supplies Board. October 3rd. Distribution boards, switches and fuses, and switch boxes. (T. 21239/40.)*

October 24th. Three batteries (twenty-six 600 Ah cells each). (T. 21552/40.)* Miscellaneous electrical requisites. (T. 21549/40.)*

September 19th. Seven electric passenger lifts, two electric goods lifts and three electric service lifts at the new G.P.O. Building, Cape Town. (T. 21012/40.)*

October 10th. Public Works Department. Laundry machinery, including electric motors, for Krugersdorp Mental Hospital. (T. 21352/40.)*

October 10th. One 15 kW Diesel engine lighting plant for the Agricultural College, Glen, O.F.S. (T. 21351/40.)*

CAPE TOWN.—October 8th. Electricity Supply Commission. Two 2,000-kVA transformers. (T. 21222/40.)*

JOHANNESBURG.—September 14th. City Council. Joint box compound. (T.Y. 21428/40.)*

October 19th. Electric lamps. (T. 21542/40.)*

September 30th. S.A.R. and Harbours Administration. Electric lamps for the year ending December 31st, 1941. (T.Y. 21434/40.)*

October 24th. Public Works Department. L.v. underground cable. (T.Y. 21433/40.)*

PORT ELIZABETH.—October 24th. City Electrical Engineer's Department. Transformers, l.v. units, &c. (T.Y. 21558/40.)*

West Riding.—September 17th. County Council. Automatic refrigeration plant at Grenoside Institution, nr. Sheffield. Specifications from acting West Riding architect, County Hall, Wakefield. Tenders to the Clerk of the C.C. County Hall.

Orders Placed

Glasgow.—Transport Committee. Accepted. Magnet coils.—Metropolitan-Vickers Electrical Co., Ltd.

Manchester. — Electricity Committee. Accepted. Ripplay system of centralised control.—Metropolitan-Vickers Electrical Co., Ltd. 30,750-kW turbo-alternator with condensing and ancillary plant.—Metropolitan-Vickers. One 85-HP slip-ring type motor and one 50-HP squirrel-cage motor.—Electric Construction Co., Ltd.

Transport Committee. Accepted. Armature coils for tramcar motors.—Manchester Armature Repair Co., Ltd.; Barratt & Thornton. Six miles of cadmium copper trolley wire.—R. Johnson & Nephew, Ltd.

Sheffield.—Electricity Committee. Accepted. Cleco electric passenger vehicle (£517).—Central Motors (Sheffield), Ltd.

Transport Committee. Contracts for permanent way materials extended for twelve months.—Dorman Long & Co., Ltd.; Edgar Allen & Co., Ltd.; Titan Trackwork Co., Ltd.; Hadfields, Ltd.; Ibbotson Bros. & Co., Ltd.; G. Cooper & Sons.

Southampton.—Electricity Committee. Accepted. Feeder panel (£495).—A. Reyrolle & Co., Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick.—Shelters; R.D.C. surveyor.

Barrowford.—Communal shelters (10), at Council Schools, for U.D.C.; J. F. Smithie, surveyor, Council Offices, Barrowford, near Nelson.

Bedford.—Shelters (£18,000); borough engineer.

Birkenhead. — Extensions to works; Fawcett, Preston & Co., Ltd.

Bolton. — Further school shelters (£5,520); borough engineer.

Bournemouth.—Additions, corner of Holhenhurst Road and Malmesbury Park Road; Moores (Bournemouth), Ltd.

Brierfield.—Communal shelters for U.D.C.; surveyor, Brierfield, Nelson.

Brighouse.—Extension of fire station and alteration of premises for fire service; H. A. Sneezum, borough surveyor, Town Hall.

Cheltenham.—Shelter, for Marks & Spencer, Ltd.

Chelmsford.—Shelters (£6,000); borough engineer.

Chesterfield.—Communal shelters at Hasland for R.D.C.; J. B. Wikeley, surveyor, Salter Gate.

Chislehurst.—Salvage building (£800); U.D.C. surveyor.

Clitheroe.—Extensions to abattoir and installation of a refrigerator; F. Margerison, borough engineer, Town Hall.

Colwyn Bay.—Eisteddfod hall; secretary, Eisteddfod Office, Colwyn Bay.

Durham.—Cleansing station at Wolsingham; W. J. Merrett, county surveyor, 43, Old Elvet, Durham.

Eire.—DUBLIN.—New fever hospital at Clondalkin (£300,000); city surveyor.

CASTLEBAR.—Bacon factory extension; John P. McCormack, builder, Castlebar.

Enfield.—Works additions; Pumfrey & Green, Ltd.

Glasgow.—Extension to works for C. F. Howden; Cowieson, Ltd.

Shelters at Crookston House and Barnhill Institution; T. Somers, architect, Municipal Buildings.

(Continued on next page.)

Financial Section *(Concluded from page 208)*

business as electrical engineers. The failure is attributed to the falling off in the turnover during the last two years, which resulted in the volume of business being insufficient to cover the overhead expenses. The liquidation was left in the hands of the Official Receiver.

Buell Combustion Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. H. A. Neuschild, 49, Moorgate, London, E.C.2.

Bankruptcy Proceedings

E. E. Garfield, electrician, 49, Ormond Street, Aston, Birmingham.—The first meeting of creditors was held recently at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, when the case was left in the hands of the Official Receiver as trustee. The debtor's statement of affairs disclosed ranking liabilities of £473 against assets estimated to realise £31. The failure was ascribed to keen competition and paying an excessive price for the business.

T. W. Dennison (T. W. Dennison & Co.), electrical and radio enginer, 40, Thornton Road, Bradford.—First and final dividend of 5¾d. in the £, payable September 12th at 71, Manningham Lane, Bradford.

F. E. Walton, electrical enginer, Island Hotel, Eel Pie Island, Twickenham, Middx. — Supplemental dividend of 18s. 7¾d. in the £ and 4 per cent. statutory interest, payable September 9th at 29, Russell Square, London, W.C.1.

Reports and Dividends

Waite & Son, Ltd., report a net trading profit for the year to March 31st of £4,001, as compared with £1,403 for the preceding year. Tax reserve receives £1,059 and the dividend for the year is 2 per cent. The balance carried forward is increased from £886 to £3,024.

The British Oxygen Co. has declared an interim dividend on the ordinary stock of 7 per cent. This is at the same rate as last year, but is payable on a capital increased by the 20 per cent. share bonus in April.

The City of London Electric Lighting Co., Ltd., has declared an interim ordinary dividend of 3 per cent. (against 3½ per cent.).

The Pennsylvania Water and Power Co. is paying a quarterly dividend of $1 on the common shares (same).

Hoover, Ltd., are maintaining their interim dividend at 3½ per cent.

The Vera Cruz Electric Light, Power and Traction Co. reports operating revenues for the year to December 31st of £36,115, and a loss, before exchange adjustment, of £3,254. The total deficit at December 31st, 1939, was £107,830. Electricity sold and accounted for amounted to 12.5 million kWh, an increase of 944,000 kWh.

The Ebonite Container Co., Ltd., has announced an interim dividend of 5 per cent., less tax (against 3 per cent.).

The Globe Telegraph & Trust is paying a quarterly dividend of 1¼ per cent., tax free (same).

Cammell Laird & Co., Ltd., is maintaining its interim ordinary dividend at 4 per cent., actual, less tax.

Drying shed, for James Thomson & Son; J. Austin Laird, architect, 55, West Regent Street, Glasgow.

Extension at Hopehill Works, for C. F. Howden; Cowiesons, Ltd., architects, Charles Street, Glasgow, N.

Improvements, Ardgoil school (£2,576); city engineer.

Store buildings at Stobhill Hospital (£1,369); R. Gilchrist & Son, Ltd.

Hinckley. — Mission Church, Wykin; E. H. Crump, architect, George Street Chambers, Hinckley.

Ilford.—Shop at High Street, Barkingside; London Co-operative Society, Ltd.

Keighley. — Communal and domestic shelters; E. G. Felgate, borough architect, College Street, Keighley.

Kenilworth.—Brick communal shelters on various sites for U.D.C.; G. A. T. Edmundson, surveyor, Council Offices.

London.—WANDSWORTH.—Decontamination laundries (£1,090); borough surveyor.

Ludlow.—Public and domestic type shelters, Craven Arms and Cleobury Mortimer; G. W. Graham, surveyor, R.D.C. Offices.

Mortuary for town and rural areas, for R.D.C.; surveyor, Council Offices.

Lydney.—Mortuary, for R.D.C.; surveyor, Rushyleaze Road.

Manchester.—Public communal shelters; G. Noel Hill, city architect, Town Hall.

Middlesbrough. — Public shelters; borough engineer.

Morley.—Additions to Oak Mills; J. W. Appleyard & Sons, Ltd.

Morley.—Seven 50-person public shelters; F. Turner, borough surveyor, Town Hall.

Newcastle-on-Tyne. — Workshop at premises of Nicholsons (Newcastle), Ltd.

Air-raid shelter at Newton Park Hotel; Bede Distributors, Ltd., contractors, 32, Carliol Street, Newcastle.

Public shelter at W. J. Ward & Co.'s premises; G. B. Tait, architect, City Council offices, Cloth Market, Newcastle.

Public shelter at the Dex Garage; Tate & Holmes, contractors, Benwell Village, Newcastle.

First-aid rooms at works of George Angus & Co., Ltd.; Hetherington & Wilson, architects, County Chambers, Westgate Road, Newcastle.

Public shelter at the Gaiety Theatre; H. Kindred, contractor, Roseville, Sunniside, Whickham, Co. Durham.

Northumberland.—Air-raid shelters at Berwick and Hexham schools for County Council; W. W. Tasker, County Architect, Mitford Road, Morpeth, Northumberland.

Ramsbottom.—Rebuilding wire works for F. D. Sims, Ltd.; Warburton & Haworth, builders, Peal Brow, Square Street, Ramsbottom, near Bury, Lancs.

Rotherham.—Domestic and communal shelters on 97 sites, for R.D.C.; A. E. Lant, engineer and surveyor, Moorgate Street, Rotherham.

Salisbury.—Fire station, for Salisbury and Wilton District Fire Brigade; A. G. Tryhorn, chairman of Fire Brigade Committee.

Scarborough.—Shelters (£80,000); H. V. Overfield, borough engineer.

Seaham Harbour (CO. DURHAM).—Air-raid shelter at Dawdon, for Seaham Harbour Urban District Council; J. B. Abbey, surveyor, U.D.C. offices, Seaham Harbour.

Sedgefield. — Shelters at hospital; R.D.C. surveyor.

Selby.—Potato factory; H. H. Goodman, architect, Wheeler Gate, Nottingham.

Sevenoaks.—Conversion of old oast house into depôt, for R.D.C.; surveyor, Oakhill Road, Sevenoaks, Kent.

Stokesley.—Public shelters (6), for the R.D.C.; Walter Thompson, builder, Northallerton

Swale (KENT).—Public shelters, for R.D.C.; surveyor, 48, Bell Road, Sittingbourne.

Tadcaster.—Fire stations, for R.D.C.: Smith & Blakeney, Ltd., builders, Galway Street, Leeds, 11.

Tipton.—Canteen; W. G. Allen & Son, Ltd.

Wakefield.—Public shelters, for R.D.C.; W. E. Massie, surveyor, 18, St. John's North.

Wallsend-on-Tyne. — More domestic shelters, for Town Council; J. H. James, contractor, The Boundary, Wallsend-on-Tyne.

Walton and Weybridge.—Reconstruction of sewage works (£13,330), for U.D.C.; surveyor, Council Offices, Hersham Road, Walton-on-Thames.

Warwickshire.—Extensions to School House, Claverdon; A. C. Bunch, county architect, Shire Hall, Warwick.

Whitworth.—Communal shelters (6), and five shelters at Council schools; G. V. Law, surveyor, Council Offices, Whitworth, near Rochdale.

Witham (ESSEX).—Extensions to Crittall factory.

Worcester.—Hospital; Frank R. Freeman, Ltd., builders, 25, Russell Square, London, W.C.

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from August 28th:—

Vole. — No. 611707. Class 2 (IV). Materials composed principally of synthetic resin and sold in the form of sheets, rods, tubes and blocks. Ellison Insulations, Ltd., Wellhead Lane, Works, Perry Barr, Birmingham.

Brush (lettering and design). — No. 610162. Class 7 (IV). Turbo-generators (electric), electric motors, generators, starters and parts thereof. No. 612289. Class 9 (IV) Electric convertors, transformers, electric switchboards (complete) and switches.—Brush Electrical Engineering Co., Ltd., Brush Works, Nottingham Road, Loughborough, Leics.

Klixon.—No. 606520. Class 9 (IV). Pressure and thermostatically controlled electric switches, thermostatically controlled timing apparatus and thermostatically actuated electric relays, etc. —Spencer Thermostat Co., Attleboro', Mass., U.S.A. (British representatives: Frank B. Dehn & Co., 103 Kingsway, London, W.C.2).

Carrier.—No. 608831. Class 11 (IV). Refrigerating and ventilating systems. Carrier Engineering Co., Ltd., 24, Buckingham Gate, Westminster, S.W.1.

Regal.—No. 612295. Class 11 (IV). Electric lamps (ordinary).—Louis Epstein, 62, Compayne Gardens, London, N.W.6.

Dutch East Indies Trade

New Electrical Suppliers Required

IN past years the principal suppliers of the import requirements of the Netherlands East Indies were in order of importance: Japan, Holland, Great Britain, the United States and Germany. It is not easy to gather from the official trade returns the precise share of each country because the Straits Settlements are credited with certain goods which are doubtless transhipments from other countries, largely Great Britain. The important fact at present is that the Dutch East Indies can no longer cover their import requirements through former manufacturing suppliers in Holland, Germany and other parts of Continental Europe now subject to blockade; and that in Dutch and Dutch East Indian circles the wish has been expressed that British manufacturers should now furnish as much as possible of the goods formerly procured from Germany, particularly in view of the increased quantities of local produce which Great Britain has been buying. Some concerns associated with the trade of the Islands have transferred their head offices from Holland to Batavia or other local importing centres, and others have offices in London.

Before the war attention was called by the British Chamber of Commerce for the Netherlands East Indies to the fact that Great Britain's share in certain trades in that market was limited by territorial agreements which had been arranged between big concerns engaged in world trade. If the existence of such arrangements accounted for the small share of this country in the electrical trade of the Dutch colonies, it may be assumed that prospects will be the brighter for the automatic termination of any such agreements with Germany that has resulted from the war.

In all the circumstances it is of particular interest to analyse details of the import trade of the islands and see what countries have been participating in it. The following statement showing the chief groups of electrical imports into Java and Madura in 1939 has been extracted from the official trade statistics of these Dutch colonies, and a note of increase or decrease compared with 1938 added. (7½ fl. equals approx £1.) In an early issue it is proposed to examine also the electrical requirements of the islands forming the outer possessions of the Dutch East Indian Empire.

	1939 Fl. (000)	Inc. or dec. on 1938 Fl. (000)
Electric cable—		
Total	531	−306
From Holland	210	−114
„ Germany	111	−316
„ Great Britain	116	+ 94
„ Italy	90	+ 32
Elec. installation material for buildings, unspecified—		
Total	648	−120
From Holland	310	−110
„ Germany	263	− 14
„ Japan	15	+ 3
Batteries for torches—		
Total	269	− 90
From China	106	− 11
„ Japan	94	− 53
„ Hong Kong	51	− 20
Accumulators—		
Total	284	−154
From Holland	8	− 63
„ Great Britain	32	− 64
„ United States	105	+ 6
„ Germany	81	− 37
„ Japan	42	+ 17

	1939 Fl. (000)	Inc. or dec. on 1938 Fl. (000)
Dynamos, motors, transformers, etc.—		
Total	717	−767
From Holland	196	−417
„ Germany	249	−153
„ Sweden	64	− 13
„ Switzerland	40	−158
„ United States	57	+ 16
Radio receivers combined with loud speakers—		
Total	1,055	*
From Holland	942	
„ Great Britain	38	
„ Germany	59	
Radio apparatus and parts—		
Total	981	*
From Holland	830	
„ Great Britain	9	
„ Germany	66	
„ United States	72	

* Comparative figures not available.

	1939 Fl. (000)	Inc. or dec. on 1938 Fl. (000)
Radio valves—		
Total	927	+ 42
From Holland	885	+ 48
„ United States	21	− 7
Electric lamps for cycles and torches—		
Total	187	+ 32
From China	146	+ 81
„ Japan	17	− 16
Electric lamps for motor cars—		
Total	42	− 40
From Holland	33	− 37
Electric lamps, other—		
Total	1,008	−201
From Holland	732	−202
„ Germany	114	− 22
„ Japan	30	− 10
Electric pocket and cycle lamps—		
Total	169	− 22
From Hong Kong	59	− 34
„ China	84	+ 42